



U.S. Fish & Wildlife Service

Rappahannock River Valley National Wildlife Refuge

*Comprehensive Conservation Plan
December 2009*



Front cover:

Rappahannock River and Cat Point Creek

Brian Watts/The College of William and Mary

Dickcissel

John Drummond/USFWS

Wilna Tract grassland flowers

USFWS

Wilna Tract Pond

USFWS

Bald eagle

Steve Hillebrand/USFWS

Back cover:

Rappahannock River and Cat Point Creek

Brian Watts/The College of William and Mary



*This blue goose, designed by
J.N. "Ding" Darling, has become
the symbol of the National Wildlife
Refuge System.*

The *U.S. Fish and Wildlife Service* is the principal Federal agency responsible for conserving, protecting, and enhancing fish, wildlife, plants, and their habitats for the continuing benefit of the American people. The Service manages the 150-million acre National Wildlife Refuge System comprised of more than 550 national wildlife refuges and thousands of waterfowl production areas. It also operates 70 national fish hatcheries and 81 ecological services field stations. The agency enforces Federal wildlife laws, manages migratory bird populations, restores nationally significant fisheries, conserves and restores wildlife habitat such as wetlands, administers the Endangered Species Act, and helps foreign governments with their conservation efforts. It also oversees the Federal Assistance Program which distributes hundreds of millions of dollars in excise taxes on fishing and hunting equipment to state wildlife agencies.

Comprehensive Conservation Plans provide long term guidance for management decisions and set forth goals, objectives, and strategies needed to accomplish refuge purposes and identify the Service's best estimate of future needs. These plans detail program planning levels that are sometimes substantially above current budget allocations and, as such, are primarily for Service strategic planning and program prioritization purposes. The plans do not constitute a commitment for staffing increases, operational and maintenance increases, or funding for future land acquisition.



U.S. Fish & Wildlife Service

Rappahannock River Valley National Wildlife Refuge

*Comprehensive Conservation Plan
December 2009*

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Rappahannock River Valley National Wildlife Refuge

Comprehensive Conservation Plan

December 2009

Abstract

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This Comprehensive Conservation Plan (CCP) for the 7,711 acre Rappahannock River Valley National Wildlife Refuge is the culmination of a planning effort involving several Virginia state agencies, local partners, refuge neighbors, private landowners, the Rappahannock Wildlife Refuge Friends Group, and the local community. This CCP establishes 15-year management goals and objectives for wildlife and habitats, public use, and administration and facilities.

Under this plan, we make improvements to our biological and public use programs. We prioritize our management activities for wildlife and habitats and the visitor services we provide in order to be more effective and efficient with our resources. We will improve our outreach and visibility on the refuge and in nearby communities through new or enhanced partnerships. We will also continue to work hard with our land conservation partners to help identify and protect valuable wildlife habitats. Finally, we will employ an adaptive management approach that includes adjusting our activities as results from management actions become better understood. This flexibility is especially important as we face ecological uncertainties, such as the predicted impacts of climate change.



U.S. Fish & Wildlife Service

Rappahannock River Valley National Wildlife Refuge

Comprehensive Conservation Plan

Refuge Vision Statement

“On the Rappahannock River Valley National Wildlife Refuge, birds will raise their young in native habitats of field, forest, and marsh. They will find rest and nourishment during migration and a haven in winter. We will manage refuge lands and waters with an emphasis on species whose populations have declined, assisting them on the road to recovery.

“In partnership with others, we will contribute to the communities where we exist, helping renew the health and vitality of the Rappahannock River and the Chesapeake Bay. We will complement the rich traditions of hunting, fishing, forestry and agriculture on Virginia’s Northern Neck and Middle Peninsula.

“The refuge will serve as an outdoor classroom, where students of all ages will study nature’s complexity, contributing to our understanding and appreciation of the natural world and the National Wildlife Refuge System. All those who visit will find enjoyment in the presence of healthy and abundant fish, wildlife, and plants, and will leave with a renewed personal commitment to land conservation and stewardship.”

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Chapter 1



Sunset over the Rappahannock River

Purpose of and Need For Action

- Introduction
- The Purpose of and Need for the Proposed Action
- The Service and the Refuge System: Policies and Mandates Guiding Planning
- The National Wildlife Refuge System and its Mission and Policies
- Conservation Plans and Initiatives Guiding the Proposed Action
- Refuge Establishment Purposes and it's Land Acquisition History
- Refuge Administration
- Refuge Operational Plans ("Step-down" Plans)
- Refuge Vision Statement
- Refuge Goals

Introduction

The purposes for establishing the Rappahannock River Valley National Wildlife Refuge (refuge) are to conserve and protect fish and wildlife resources, including endangered and threatened species and wetlands. Refuge habitats include freshwater tidal marsh, forested swamp, upland deciduous forest, mixed pine forest, and managed grassland.

The U.S. Fish and Wildlife Service (Service, we, our) purchased the first tract of land for the refuge in 1996. By September 30, 2007, it comprised 7,711 acres. Within its 268,000-acre approved acquisition boundary (Service 1995), we are authorized to purchase up to 20,000 acres in conservation easement or fee title. That approved boundary lies on either side of the Rappahannock River, including parts of Lancaster, Middlesex, Richmond, Essex, Caroline, Westmoreland, and King George counties (see map 1.1).

This Comprehensive Conservation Plan (CCP) for the Rappahannock River Valley National Wildlife Refuge (refuge) was prepared pursuant to the National Wildlife Refuge System Administrative Act of 1996, as amended by the National Wildlife Refuge System Improvement Act of 1997 (16 U.S.C. 6688dd et seq.; Refuge Improvement Act). An environmental assessment (EA), required by the National Environmental Policy Act of 1969 (NEPA), was prepared with the draft CCP.

This final CCP presents the combination of management goals, objectives, and strategies that we believe will best achieve our vision and goals for the refuge; contribute to the mission of the National Wildlife Refuge System (Refuge System); achieve the refuge purposes; fulfill legal mandates; address key issues; incorporate sound principles of fish and wildlife management, and serve the American public. This CCP will guide management decisions and actions on the refuge over the next 15 years. It will also help us communicate our priorities to the Commonwealth of Virginia's natural resource agencies, our conservation partners, local communities, and the public.

Chapter 1, "The Purpose of and Need for Action," explains the purpose of and need for preparing a CCP, and sets the stage for four subsequent chapters and eight appendixes. Specifically, chapter 1:

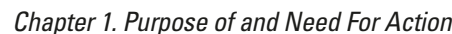
- defines our planning analysis area,
- presents the mission, policies and mandates affecting the development of the plan,
- identifies other conservation plans we used as references,
- lists the purposes for which the refuge was established and its land acquisition history, and
- clarifies the vision and goals that drive refuge management.

Chapter 2, "The Planning Process," describes the planning process we followed, including public and partner involvement in developing this final CCP. Chapter 2 also

- describes our compliance with National Environmental Policy Act (NEPA) regulations, and
- identifies public issues or concerns that surfaced as we developed the plan.

Chapter 3, "The Existing Environment," describes the physical, biological, and human environments of the refuge.

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The Purpose of and Need for the Proposed Action

Chapter 4, “Management Direction and Implementation,” presents the goals, objectives, strategies, and actions that will guide our decision-making and land management. It also outlines the and funding needed to accomplish that management.

Chapter 5, “Consultation and Coordination with Others,” summarizes how we involved the public and our partners in the planning process. Their involvement is vital for the future management of this refuge and all national wildlife refuges.

Eight appendixes, a glossary with acronyms, and a bibliography of literature cited provide additional documentation and references to support our narratives and analysis.

We developed a final CCP for the refuge that, in the Service’s best professional judgment, best achieves the purposes, vision, and goals of the refuge; contributes to the mission of the National Wildlife Refuge System; adheres to Service policies and other mandates; addresses identified issues of significance; and, incorporates sound principles of fish and wildlife science.

The *purpose* of adopting a CCP for this refuge is to accomplish the following goals:

Goal 1. Contribute to the biological diversity of the mid-Atlantic region by protecting, enhancing, and restoring the refuge’s upland habitats, with an emphasis on breeding, migrating, and wintering birds.

Goal 2. Maintain the long-term biological integrity of riparian habitats along the Rappahannock River and its tributaries for bald eagles and other migratory birds.

Goal 3. Maintain and enhance the biological diversity and environmental health of tidal and non-tidal wetlands to benefit Federal listed species, waterfowl, other migratory birds, fish and shellfish, reptiles, and amphibians.

Goal 4. Promote enjoyment and stewardship of our Nation’s natural resources by providing high-quality, wildlife-dependent recreational and educational opportunities on refuge lands and waters.

Goal 5. Communicate and collaborate with local communities, Federal and state agencies, and conservation organizations throughout the lower Rappahannock River watershed to promote natural resource conservation and the mission of the Refuge System.

The *need* for a CCP on this refuge is manifold. First, the Improvement Act requires us to write CCPs for all national wildlife refuges by 2012 to help fulfill the mission of the Refuge System. Also, new Service policies providing specific guidance on implementing the Improvement Act have been developed since the refuge was established. A CCP incorporates those policies, and develops strategic management direction for the refuge for 15 years, by

- stating clearly the desired future conditions for refuge habitat, wildlife, visitor services, staffing, and facilities;
- explaining concisely to state agencies, refuge neighbors, visitors, partners, and other stakeholders the reasons for management actions;
- ensuring that refuge management conforms to the policies and goals of the Refuge System and is consistent with legal mandates;
- ensuring that present and future public uses are appropriate and compatible;

- providing long-term continuity and consistency in management direction; and,
- justifying budget requests for staffing, operating and maintenance funds.

In addition, other needs are manifest. This refuge lacks a master plan to implement that strategic management direction and guide our decisions. The environment of the refuge has changed considerably since 1996. Most notably, the refuge grew to its present size. The economy and patterns of land use and land ownership in local communities are changing. The pressures for public use and access have continued to increase. New ecosystem and species conservation plans have developed that bear directly on refuge management. The priority of habitat management and restoration to control invasive plants has grown. We also must evaluate our administrative and visitor facilities, including their locations, to ensure the best customer service possible. Finally, as responsible stewards of Federal lands, conveying our vision and priorities for the refuge to our partners, local communities, and interested and affected individuals is imperative.

Regional Context

The regional context for this CCP is the Rappahannock River watershed (map 1.2). The Rappahannock River is part of the of the Chesapeake Bay/Susquehanna River ecosystem. The main stem of the Rappahannock River originates in Chester Gap, a mountainous region near Front Royal, Virginia, at an elevation of 1,350 feet. The Rapidan River joins it in the Piedmont, and they continue through the western side of the coastal plain before reaching the Chesapeake Bay. The entire journey is 185 miles from source to mouth. The watershed of the two rivers combined comprises about 2 million acres.

The Service and the Refuge System: Policies and Mandates Guiding Planning

The U.S. Fish and Wildlife Service and its Mission

As part of the Department of the Interior, the Service administers the Refuge System. The Service mission is “*Working with others, to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people.*”



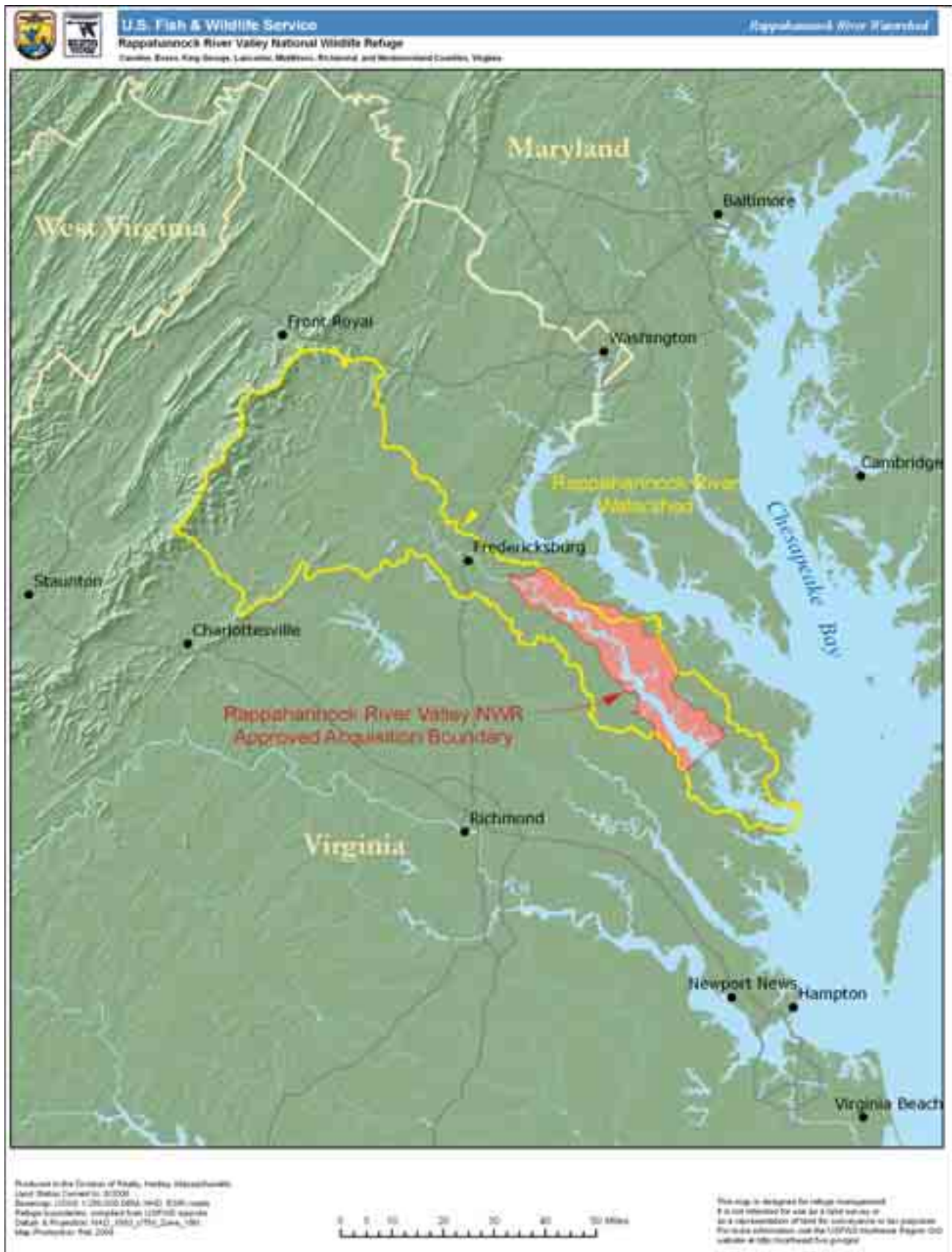
USFWS

Accessible fishing pier on the Hutchinson tract

Congress entrusts to the Service the conservation and protection of these national natural resources: migratory birds and fish, Federal-listed endangered or threatened species, inter-jurisdictional fish, wetlands, certain marine mammals, and national wildlife refuges. We also enforce Federal wildlife laws and international treaties on importing and exporting wildlife, assist states with their fish and wildlife programs, and help other countries develop conservation programs.

The Service Manual, <http://www.fws.gov/directives/direct.html>, contains the standing and continuing directives on implementing our authorities, responsibilities, and activities. We publish special directives that affect the rights of citizens or the authorities of other agencies separately in the Code of Federal Regulations (CFR); the Service Manual does not duplicate them (see 50 CFR 1–99 at <http://www.access.gpo.gov/nara/cfr/index.html>).

Map 1.2. Rappahannock River Watershed



The National Wildlife Refuge System and its Mission and Policies

The U.S. Fish and Wildlife Service and its Mission

The Refuge System is the world's largest collection of lands and waters set aside specifically for the conservation of wildlife and the protection of ecosystems. More than 550 national wildlife refuges encompass more than 150 million acres of lands and waters in all 50 states and several island territories. Each year, more than 40 million visitors hunt, fish, observe and photograph wildlife, or participate in environmental education and interpretation on refuges.

In 1997, President Clinton signed into law the National Wildlife Refuge System Improvement Act. That Act establishes a unifying mission for the Refuge System and a new process for determining the compatibility of public uses on refuges, and requires us to prepare a CCP for each refuge. The act states that the Refuge System must focus on wildlife conservation. It also states that the mission of the Refuge System, coupled with the purpose(s) for which each refuge was established, will provide the principal management direction on that refuge. The mission of the Refuge System is

“to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.”—National Wildlife Refuge System Improvement Act; Pub.L. 105–57

The Refuge Manual contains policy governing the operation and management of the Refuge System that the Fish and Wildlife Service Manual does not cover, including technical information on implementing refuge policies and guidelines on enforcing laws. You can review the Refuge Manual at refuge headquarters. These are a few noteworthy policies instrumental in developing this CCP. You may view them on the Web at <http://www.fws.gov/policy/manuals/part.cfm?series=600&seriestitle=LAND%20USE%20AND%20MANAGEMENT%20SERIES>. Highlights of some of these policies follow.

Policy on the National Wildlife Refuge System Mission, Goals and Purposes

This policy (601 FW 1) sets forth the Refuge System mission noted above, how it relates to the Service mission, and explains the relationship of the Refuge System mission and goals, and the purpose(s) of each unit in the Refuge System. In addition, it identifies the following Refuge System goals.

- Conserve a diversity of fish, wildlife, and plants;
- Develop and maintain a network of habitats;
- Conserve those ecosystems, plant communities, and wetlands that are unique within the United States;
- Provide and enhance opportunities to participate in compatible, wildlife-dependent recreation; and,
- Help to foster public understanding and appreciation of the diversity of fish, wildlife, and plants and their habitats.

This policy also establishes management priorities for the Refuge System.

- Conserve fish, wildlife, and plants and their habitats;

Policy on Refuge System Planning

- Facilitate compatible wildlife-dependent recreational uses; and,
- Consider other appropriate and compatible uses.

This policy (602 FW 1, 2, 3) establishes the requirements and guidance for Refuge System planning, including CCPs and step-down management plans. It states that we will manage all refuges in accordance with an approved CCP that, when implemented, will help

- achieve refuge purposes;
- fulfill the Refuge System mission;
- maintain and, where appropriate, restore the ecological integrity of each refuge and the Refuge System;
- achieve the goals of the National Wilderness Preservation System and the National Wild and Scenic Rivers System; and,
- conform to other applicable laws, mandates, and policies.

That planning policy provides step-by-step directions and identifies the minimum requirements for developing all CCPs. Among them, we are to review any existing special designation areas such as wilderness and wild and scenic rivers, specifically address the potential for any new special designations, conduct a wilderness review, and incorporate a summary of that review into each CCP (602 FW 3).

Policy on the Appropriateness of Refuge Uses

Federal law and Service policy provide the direction and planning framework for protecting the Refuge System from inappropriate, incompatible or harmful human activities and ensuring that visitors can enjoy its lands and waters. This policy (603 FW 1) provides a national framework for determining appropriate refuge uses to prevent or eliminate those that should not occur in the Refuge System. It describes the initial decision process the refuge manager follows when first considering whether to allow a proposed use on a refuge. An appropriate use must meet at least one of the following four conditions.

- 1) The use is a wildlife-dependent recreational use as identified in the Improvement Act.
- 2) The use contributes to fulfilling the refuge purpose(s), the Refuge System mission, or goals or objectives described in a refuge management plan approved after October 9, 1997, the date the Improvement Act became law.
- 3) The use follows state regulations for the take of fish and wildlife.
- 4) The use has been found to be appropriate after concluding a specified findings process using 10 criteria.



Fall on the refuge

USFWS

You may view that policy on the Web at <http://www.fws.gov/policy/library/06-5645.pdf>.

Policy on Compatibility

This policy (603 FW 2) complements the appropriateness policy. Once a refuge manager finds a use appropriate, they conduct a further evaluation through a compatibility determination assessment. The direction in 603 FW 2 provides guidelines for determining compatibility of uses and procedures for documentation and periodic review of existing uses. Highlights of the guidance in that chapter follows:

- The Refuge Improvement Act and its regulations require an affirmative finding by the refuge manager on the compatibility of a public use before we allow it on a national wildlife refuge.
- A compatible use is one “that will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge.”
- The act defines six wildlife-dependent uses that are to receive enhanced consideration on refuges: “hunting, fishing, wildlife observation and photography, and environmental education and interpretation.”
- The refuge manager may authorize those priority uses on a refuge when they are compatible and consistent with public safety.
- When the refuge manager publishes a compatibility determination, it will stipulate the required maximum reevaluation dates: 15 years for wildlife-dependent recreational uses; or, 10 years for other uses.
- However, the refuge manager may reevaluate the compatibility of a use at any time: for example, sooner than its mandatory date, or even before we complete the CCP process, if new information reveals unacceptable impacts or incompatibility with refuge purposes (603 FW 2.11, 2.12).
- The refuge manager may allow or deny any use, even one that is compatible, based on other considerations such as public safety, policy, or available funding.

Policy on Wildlife-dependent Public Uses

This policy (605 FW 1) of the Service manual presents specific guidance on implementing a quality, wildlife-dependent recreation program. “Quality” is defined as a program that

- 1) promotes safety of participants, other visitors, and facilities;
- 2) promotes compliance with applicable laws and regulations and responsible behavior;
- 3) minimizes or eliminates conflict with fish and wildlife population or habitat goals or objectives in an approved plan;
- 4) minimizes or eliminates conflicts with other compatible wildlife-dependent recreation;
- 5) minimizes conflicts with neighboring landowners;
- 6) promotes accessibility and availability to a broad spectrum of the American people;
- 7) promotes resource stewardship and conservation;
- 8) promotes public understanding and increases public appreciation of America’s natural resources and our role in managing and conserving these resources;

- 9) provides reliable/reasonable opportunities to experience wildlife;
- 10) uses facilities that are accessible to people and blend into the natural setting;
and
- 11) uses visitor satisfaction to help to define and evaluate programs.

Policy on Maintaining Biological Integrity, Diversity, and Environmental Health

This policy (601 FW 3) provides guidance on maintaining or restoring the biological integrity, diversity, and environmental health of the Refuge System, including the protection of a broad spectrum of fish, wildlife, and habitat resources in refuge ecosystems. It provides refuge managers with a process for evaluating the best management direction to prevent the additional degradation of environmental conditions and restore lost or severely degraded components of the environment. It also provides guidelines for dealing with external threats to the biological integrity, diversity, and environmental health of a refuge and its ecosystem.

Other Mandates

Although Service and Refuge System policy and the purpose(s) of each refuge provide the foundation for its management, other Federal laws, executive orders, treaties, interstate compacts, and regulations on conserving and protecting natural and cultural resources also affect how we manage refuges. Our “Digest of Federal Resource Laws of Interest to the U.S. Fish and Wildlife Service” describes many of them at <http://www.fws.gov/laws/lawsdigest/index.html>.

Of particular note are the Federal laws that require the Service to identify and preserve its important historic structures, archaeological sites, and artifacts. NEPA mandates our consideration of cultural resources in planning Federal actions. The Improvement Act requires the CCP for each refuge to identify its archaeological and cultural values. Following is a highlight of some cultural and historic resource protection laws which relate to the development of CCPs.

- The Archaeological Resources Protection Act (16 U.S.C. 470aa–470ll; Pub.L. 96–95) approved October 31, 1979, (93 Stat. 721), referred to as ARPA, largely supplanted the resource protection provisions of the Antiquities Act of 1906 for archaeological items. ARPA establishes detailed requirements for issuance of permits for any excavation for or removal of archaeological resources from Federal or Native American lands. It also establishes civil and criminal penalties for the unauthorized excavation, removal, or damage of those resources; for any trafficking in those removed from Federal or Native American land in violation of any provision of Federal law; and for interstate and foreign commerce in such resources acquired, transported or received in violation of any state or local law.
- The Archeological and Historic Preservation Act (16 U.S.C. 469–469c; Pub.L. 86–523,) approved June 27, 1960, (74 Stat. 220) as amended by Pub.L. 93–291, approved May 24, 1974, (88 Stat. 174) carries out the policy established by the Historic Sites Act (see below). It directs Federal agencies to notify the Secretary of the Interior whenever they find that a Federal or Federally-assisted licensed or permitted project may cause the loss or destruction of significant scientific, prehistoric or archaeological data. The act authorizes the use of appropriated, donated or transferred funds for the recovery, protection and preservation of that data.
- The Historic Sites, Buildings and Antiquities Act (16 U.S.C. 461–462, 464–467; 49 Stat. 666) of August 21, 1935, popularly known as the Historic Sites Act, as amended by Pub.L. 89–249, approved October 9, 1965, (79 Stat. 971), declares it a national policy to preserve historic sites and objects of national significance, including those located on refuges. It provides procedures for designating, acquiring, administering and protecting them. Among other things, National Historic and Natural Landmarks are designated under the authority of this act.

- The National Historic Preservation Act of 1966 (16 U.S.C. 470–470b, 470c–470n), Pub.L. 89–665, approved October 15, 1966 (80 Stat. 915) and repeatedly amended, provides for the preservation of significant historical features (buildings, objects and sites) through a grant-in-aid program to the states. It establishes a National Register of Historic Places and a program of matching grants under the existing National Trust for Historic Preservation (16 U.S.C. 468–468d). This act establishes an Advisory Council on Historic Preservation, which became a permanent, independent agency in Pub.L. 94–422, approved September 28, 1976 (90 Stat. 1319). The act created the Historic Preservation Fund. It directs Federal agencies to take into account the effects of their actions on items or sites listed or eligible for listing on the National Register.
- The Service also has a mandate to care for museum properties it owns in the public trust. The most common are archaeological, zoological, botanical collections, historical photographs, historic objects, and art. Each refuge maintains an inventory of its museum property. Our museum property coordinator in Hadley, Massachusetts, guides the refuges in caring for that property, and helps us comply with the Native American Grave Protection and Repatriation Act and Federal regulations governing Federal archaeological collections. Our program ensures that those collections will remain available to the public for learning and research.

Other Federal resource laws are also important to highlight as they are integral to developing a CCP. The Wilderness Act of 1964 (16 U.S.C. 1131–1136; Pub.L. 88–577) establishes a National Wilderness Preservation System (NWPS) that is composed of Federal-owned areas designated by Congress as “wilderness areas.” The act directs each agency administering designated wilderness to preserve the wilderness character of areas within the NWPS, and to administer the NWPS for the use and enjoyment of the American people in a way that will leave those areas unimpaired for future use and enjoyment as wilderness. The act also directs the Secretary of the Interior, within 10 years, to review every roadless area of 5,000 acres or more and every roadless island (regardless of size) within National Wildlife Refuge and National Park systems for inclusion in the National Wilderness Preservation System. Service planning policy requires that we evaluate the potential for wilderness on refuge lands, as appropriate, during the CCP planning process.

The Wild and Scenic Rivers Act of 1968, as amended, selects certain rivers of the nation possessing remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, preserves them in a free-flowing condition, and protects their local environments. Service planning policy requires that we evaluate the potential for wild and scenic rivers designation on refuge lands, as appropriate, during the CCP planning process.

Our mandates also include orders directed by the President, Secretary of Interior, and/or Director of the U.S. Fish and Wildlife Service. We highlight three of those orders below.

- One of special importance to this document is Presidential Executive Order 13508—Chesapeake Bay Protection and Restoration (signed May 12, 2009). This order furthers the purpose of the Clean Water Act of 1972, as amended (33 U.S.C. 1251 et seq.), and other laws “...to protect and restore the health, heritage, natural resources, and social and economic value of the Nation’s largest estuarine ecosystem and the natural sustainability of its watershed.” It recognizes the Chesapeake Bay as “a national treasure constituting the largest estuary in the United States and one of the largest and most biologically productive estuaries in the world.”

It directs the establishment of a Federal Leadership Committee chaired by the Administrator of the Environmental Protection Agency, or their designee, with participation by all Federal agencies with jurisdiction in the Bay. The Committee's purpose is to lead the effort to restore the health of the Chesapeake Bay under a renewed commitment to control pollution from all sources as well as protect and restore habitat and living resources, conserve lands, and improve management of natural resources, all of which contribute to improved water quality and ecosystem health.

This order also establishes the development of a strategy for coordinated implementation of existing programs and projects and development of an annual action plan and accomplishment reports. It also requires collaboration with state partners. The focus of the coordinated implementation plan will be to address: 1) water quality; 2) sources of pollution from agricultural lands and federal lands and facilities; 3) protecting the Bay's resources as the climate changes; 4) expanding opportunities for public access; 5) conserving landscapes and ecosystems; 6) the monitoring and accountability of activities.

- Presidential Executive Order 13443—Facilitation of Hunting Heritage and Wildlife Conservation was issued on August 16, 2007. The purpose of this order is to direct Federal agencies that have programs and activities affecting public land management, outdoor recreation, and wildlife management, including the Department of the Interior and the Department of Agriculture, to facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitat. Federal agencies are directed to pursue certain activities listed in the Order, consistent with their missions. Those activities include managing wildlife and wildlife habitats on public lands in a manner that expands and enhances hunting opportunities, and working with state and tribal governments to manage wildlife and habitats to foster healthy and productive populations and provide appropriate opportunities for the public to hunt those species.
- Secretarial Order 3289—Addressing the Impacts of Climate Change on Americas Water, Land, and Other Natural and Cultural Resources, was issued on September 14, 2009. This order establishes a Department-wide, science-based approach to increasing our understanding of climate change and to coordinate an effective response to its impacts on tribes and on the land, water, ocean, fish and wildlife, and cultural heritage resources that the Department manages. The order establishes a "Climate Change Response Council" that will execute a coordinated Department-wide strategy to increase scientific understanding and the development of adaptive management tools to address the impact of climate change on our natural and cultural resources. The Council will help coordinate activities within and among federal agencies. Land management agencies are directed to pursue appropriate activities to reduce their carbon footprint, adapt water management strategies to address the possibility of a shrinking water supply, and protect and manage land in anticipation of sea level rise, shifting wildlife populations and habitats, increased wildland fire threats, and an increase in invasive and exotic species.

Conservation Plans and Initiatives Guiding the Proposed Action

Birds of Conservation Concern 2008 Report

The Service developed this report (USFWS 2008) as an update to their 2002 report in consultation with the leaders of ongoing bird conservation initiatives and such partnerships as Partners In Flight (PIF), the North American Waterfowl Management Plan (NAWMP) and Joint Ventures, the North American Waterbird Conservation Plan (NAWCP), and the U.S. Shorebird Conservation Plan. It

fulfills the mandate of the 1988 amendment to the Fish and Wildlife Conservation Act of 1980 (100 Pub. L. 100–653, Title VIII), requiring the Secretary of the Interior, through the Service, to “identify species, subspecies, and populations of all migratory non-game birds that, without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act of 1973.” The overall goal of this report is to accurately identify the migratory and non-migratory bird species (beyond those already designated as federally threatened or endangered) that represent our highest conservation priorities.

The geographic scope of this endeavor is the U.S. in its entirety, including island “territories” in the Pacific and Caribbean. The report encompasses three distinct geographic scales—the North American Bird Conservation Initiative (NABCI) Bird Conservation Regions (BCRs), the eight Service Regions, and National—and is primarily derived from assessment scores from three major bird conservation plans: the Partners in Flight North American Landbird Conservation Plan, the U.S. Shorebird Conservation Plan, and the North American Waterbird Conservation Plan. Bird species included on lists in the report include non-game birds, gamebirds without hunting seasons, subsistence-hunted non-game birds in Alaska, and Endangered Species Act candidate, proposed endangered or threatened, and recently delisted species. Population trends, threats distribution, abundance and relative density were all factors considered.

This report is intended to stimulate coordinated and collaborative proactive conservation actions among Federal, state, tribal, and private partners. It is hoped that by focusing attention on these highest-priority species, this report will promote greater study and protection of the habitats and ecological communities upon which these species depend, thereby contributing to healthy avian populations and communities. You may view the report at: <http://www.fws.gov/migratorybirds/reports/BCC2008/BCC2008m.pdf>. This is one of the plans we used in identifying species of concern in appendix A, and in developing management objectives and strategies in goals 1, 2, and 3.

**North American Waterfowl
Management Plan
(NAWMP; update 2004)
and Atlantic Coast Joint
Venture Implementation
Plan (ACJV 2005)**

Originally written in 1986, NAWMP describes a 15-year strategy promulgated by the United States, Canada, and Mexico to restore and sustain waterfowl populations by protecting, restoring and enhancing habitat. The plan committee, including representatives from each nation, has modified the 1986 plan twice to account for biological, sociological, and economic changes that influenced the status of waterfowl and the conduct of cooperative habitat conservation. The most recent modification, in 2004, (NAWMP 2004) updates the needs, priorities, and strategies for the next 15 years, increases stakeholder confidence in the direction of its actions, and guides partners in strengthening the biological foundation of North American waterfowl conservation. You may review the plan at <http://www.fws.gov/birdhabitat/NAWMP>.

To convey goals, priorities, and strategies more effectively, NAWMP 2004 is comprised of two separate documents: Strategic Guidance and Implementation Framework, the former for agency administrators and policy makers who set the direction and priorities for conservation. The latter includes supporting technical information for use by biologists and land managers.

The plans are implemented at the regional level in 14 habitat Joint Ventures and 3 species Joint Ventures: Arctic goose, black duck, and sea duck. Our project area lies in the Atlantic Coast Joint Venture (ACJV), which includes all the Atlantic Flyway states from Maine to Florida and Puerto Rico. The waterfowl goal for the Atlantic Coast Joint Venture is “Protect and manage priority wetland habitats for migration, wintering, and production of waterfowl, with special consideration to black ducks, and to benefit other wildlife in the joint venture area.”

In 2005, a revision of the original ACJV Implementation Plan (ACJV 2005) was completed. The ACJV 2005 plan presents habitat conservation goals and population indices for the ACJV consistent with the NAWMP update, provides status assessments of waterfowl and their habitats in the joint venture, and updates focus area narratives and maps for each state. That document is intended as a blueprint for conserving the valuable breeding, migration and wintering waterfowl habitat present within the ACJV boundary based on the best available information and the expert opinion of waterfowl biologists from throughout the flyway. You may review the ACJV 2005 at http://www.acjv.org/acjv_publications.htm.

The Black Duck Joint Venture plan also relates to our project area. Black ducks use the refuge year-round, and are most plentiful during fall migration and winter. The Black Duck Joint Venture Plan, Final Draft Strategic Plan (USFWS/CWS 1993) can be viewed at <http://www.pwrc.usgs.gov/bdjv/>.

We used these plans in identifying species of concern in appendix A, and in developing management objectives and strategies under goals 1, 2, and 3.

New England/Mid-Atlantic Bird Conservation Region (BCR 30) Implementation Plan (2007)

The refuge lies in the New England/Mid-Atlantic BCR 30, which lists birds of high conservation priority for the region. BCR 30 provides important resources for migratory birds whose ranges span the western hemisphere. The habitats associated with coastal ecosystems provide the highest habitat values and critical staging areas for migratory waterfowl, waterbirds, shorebirds, and landbirds. Forested upland communities, are the second most important habitats for migratory birds in the BCR. The Chesapeake Bay and Delaware Bay, as well as other major bays in the BCR, provide crucial resources for many migrating birds as they journey from their breeding sites in the north to non-breeding sites in Mexico, Central America, the Caribbean and South America.

Unfortunately, most of the lands in BCR 30 have been altered from their historic condition. Urban development and agriculture dominates much of the landscape. The loss or degradation of habitat (e.g., by fragmentation, agriculture, and invasive species) are the greatest threats to bird populations in BCR 30. This plan identifies the bird species and habitats in greatest need of conservation action in this region, activities thought to be most useful to address those needs, and geographic areas believed to be the most important places for those activities. This plan is meant to start a regional bird conservation initiative of partners across BCR 30 communicating their conservation planning and implementation activities to deliver high-priority conservation actions in a coordinated manner. You may view the BCR 30 implementation plan at http://www.acjv.org/bcr30_draft.htm.

We used this plan in identifying species of concern in appendix A, and in developing management objectives and strategies under goals 1, 2, and 3.

North American Waterbird Conservation Plan (Version 1, 2002)

This plan (Kushlan et al., 2002) is an independent partnership among individuals and institutions with the interest in and responsibility for conserving water birds and their habitats. The plan is just one element of a multi-faceted conservation program.



Scarlet tanager

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Its primary goal is to ensure that the distribution, diversity, and abundance of populations and habitats of breeding, migratory, and non-breeding water birds are sustained or restored throughout the lands and waters of North America, Central America, and the Caribbean. It provides a framework for conserving and managing colonially nesting water-dependent birds. In addition, it will facilitate continent-wide planning and monitoring, national, state, and provincial conservation, regional coordination, and local habitat protection and management. You may access the plan at <http://www.nawcp.org/pubs/ContinentalPlan.cfm>.

In 2006, the Mid-Atlantic New England Working Group developed the Waterbird Conservation Plan for the Mid-Atlantic/New England/Maritimes (MANEM) Region (MANEM Waterbird Working Group 2006). This plan is being implemented between 2006 and 2010. It consists of technical appendixes on (1) waterbird populations including occurrence, status, and conservation needs, (2) waterbird habitats and locations within the region that are crucial for waterbird sustainability, (3) MANEM partners and regional expertise for waterbird conservation, and (4) conservation project descriptions that present current and proposed research, management, habitat acquisition, and education activities. Summarized information on waterbirds and their habitats provides a regional perspective for local conservation action. You may access the plan at <http://www.fws.gov/birds/waterbirds/manem/index.html>.

We used this plan in identifying species of concern in appendix A, and in developing management objectives and strategies under goals 1, 2, and 3.

U.S. Shorebird (2001, 2nd Edition) and North Atlantic Regional Shorebird Plans

Concerns about shorebirds led to the creation of the U.S. Shorebird Conservation Plan in 2000. A second edition was published in May 2001 (Brown et al. 2001). Developed in a partnership with individuals and organizations throughout the United States, the plan presents conservation goals for each U.S. region, identifies important habitat conservation and research needs, and proposes education and outreach programs to increase public awareness of shorebirds and of threats to them. You may read the plan at <http://www.fws.gov/shorebirdplan/USShorebird/downloads/USShorebirdPlan2Ed.pdf>.

In the Northeast, the North Atlantic Regional Shorebird Plan (Clark & Niles, North Atlantic Shorebird Habitat Working Group 2000) was drafted to step down the goals of the continental plan to smaller scales to identify priority species, habitat and species goals, and implementation projects. You may view the North Atlantic Regional Shorebird Plan at <http://www.fws.gov/shorebirdplan/RegionalShorebird/RegionalPlans.htm>.

We used this plan in identifying species of concern in appendix A, and in developing management objectives and strategies under goals 1, 2, and 3.

National Bald Eagle Management Guidelines (May 2007) and Virginia Bald Eagle Guidelines

In July 2007, the Service issued a final ruling to remove the bald eagle from the Federal list of endangered and threatened species. The bald eagle remains under the protection of the Bald and Golden Eagle Protection Act (Eagle Act) and the Migratory Bird Treaty Act (MBTA). The Service developed National Bald Eagle Management Guidelines to advise landowners, land managers, and others who share public and private lands with bald eagles when and under what circumstances the protective provisions of the Eagle Act may apply to their activities. The guidelines help minimize impacts on bald eagles, particularly where people may constitute a “disturbance,” which the Eagle Act prohibits. The guidelines (1) publicize the provisions of the Eagle Act that continue to protect bald eagles, to reduce the possibility that people will violate the law, (2) advise landowners, land managers and the public of the potential for various human activities to disturb bald eagles, and (3) encourage additional, nonbinding land management practices that benefit bald eagles. We intended the guidelines primarily as a tool for landowners and planners who seek information and recommendations on how to avoid disturbing bald eagles. You

may view the guidelines at <http://www.fws.gov/migratorybirds/issues/BaldEagle/NationalBaldEagleManagementGuidelines.pdf>.

Because of the delisting, the specific guidelines for Virginia's bald eagles, prepared by our Virginia Field Office and the Virginia Department of Game and Inland Fisheries (VDGIF), are being revised. The bald eagle remains a state threatened species in Virginia, and because of the importance of the Chesapeake Bay region for the entire Atlantic population of eagles, we will consider state guidelines regarding time-of-year restrictions and distance requirements from nests and concentration areas, even if they are more stringent than the national guidelines. We referred to those guidelines as we developed our management objectives and strategies for bald eagles.

Partners In Flight Bird Conservation Plans

In 1990, Partners In Flight (PIF) began as a voluntary, international coalition of government agencies, conservation organizations, academic institutions, private industries, and citizens dedicated to reversing the population declines of bird species and "keeping common birds common." The foundation of PIF's long-term strategy is a series of scientifically based bird conservation plans using physiographic areas as planning units.

The goal of each PIF plan is to ensure the long-term maintenance of healthy populations of native birds, primarily non-game birds. The plan for each physiographic area ranks bird species according to their conservation priority, describes their desired habitat conditions, develops biological objectives, and recommends conservation measures. The priority ranking factors in habitat loss, population trends, and the vulnerability of a species and its habitats to regional and local threats.

Physiographic Area 44—Mid-Atlantic Coastal Plain (April 1999).—Our project area lies in Physiographic Area 44, the Mid-Atlantic Coastal Region. We referred to this plan in developing our list of species of conservation concern in appendix A, as well as our habitat objectives and strategies under goals 1, 2, and 3. This plan can be accessed at http://www.blm.gov/wildlife/plan/pl_44_10.pdf.

Partners in Amphibian and Reptile Conservation, National State Agency Herpetological Conservation Report (Draft 2004)

Partners in Amphibian and Reptile Conservation (PARC) was created in response to the increasing, well-documented national declines in amphibian and reptile populations. Many consider it the most comprehensive effort in herpetofaunal conservation. PARC members come from state and Federal agencies, conservation organizations, museums, the pet trade industry, nature centers, zoos, the power industry, universities, herpetological organizations, research laboratories, forest industries and environmental consultants. Its five geographic regions—Northeast,

Southeast, Midwest, Southwest and Northwest—can focus on national and regional challenges in herpetofaunal conservation. Regional working groups allow for region-specific communication. The Northeast working group has developed "Model State Herpetofauna Regulatory Guidelines" which informs us on specific habitat management prescriptions for the benefit of different taxonomic groups of herpetofauna. We consulted these guidelines as we developed our strategy; this document can be found at (<http://www.pwrc.usgs.gov/neparc/products/modelherpregs.htm>)

The National State Agency Herpetological Conservation Report (NHCR) is a summary report (PARC 2004) sponsored by PARC that provides a general overview of each state wildlife agency's support for reptile and amphibian conservation and

Northern water snake



USFWS

research through September 2004. It lists amphibian and reptile species of concern for each state. Each state report was compiled in cooperation with its agency's lead biologist on herpetofaunal conservation. That report can be accessed at <http://www.parcplace.org/documents/PARCNationalStates2004.pdf>. Its purpose is to facilitate communication among state agencies and partner organizations throughout the PARC network to identify and address regional and national herpetological priorities.

PARC intends to expand the scope of the NHCR to include other states, provinces, and territories. It will include other state agencies that are supporting herpetofaunal conservation and research, such as transportation departments, park departments, and forest agencies. The next NHCR report will integrate a list of the Species of Conservation Concern into each state's comprehensive conservation wildlife strategy (see below).

**U.S. Fish & Wildlife
Service Fisheries Program,
Northeast Region
Strategic Plan 2009–2013
(January 2009)**

The Service's Fisheries Program (Program) primary mission is to work with others to maintain self-sustaining, healthy populations of coastal and anadromous fish (fish that spend part of their lives in fresh water and part in the ocean), fish species that cross state or national boundaries, and endangered aquatic animals and their habitats. In the Northeast Region, 25 fishery management offices and national fish hatcheries work with states and other partners to restore and protect a variety of fish and other aquatic species. Examples include Atlantic salmon (*Salmo salar*), striped bass (*Morone saxatilis*), American shad (*Alosa sapidissima*), river herring (*Alosa pseudoharengus*, *Alosa aestivalis*), sturgeon (*Acipenser oxyrinchus oxyrinchus*), horseshoe crab (*Limulus polyphemus*), American eel (*Anguilla rostrata*), and menhaden (*Brevoortia tyrannus*).

The Program has played a vital role in conserving and managing fish and other aquatic resources since 1871. Today, the Program is a critical partner with states, Tribes, other governments, other Service programs, private organizations, public institutions, and interested citizens in a larger effort to conserve these important resources. In 2002, working with its many partners in aquatic conservation through the Sport Fishing and Boating Partnership Council's Fisheries Steering Committee, the Service completed its Strategic Vision (Vision) document: "Conserving America's Fisheries, U.S. Fish and Wildlife Service Fisheries Program Vision for the Future." That vision document includes goals, objectives, and action items on a national programmatic scale.

The Program is committed to working with partners to

- Protect the health of aquatic habitats;
- Restore fish and other aquatic resources; and
- Provide opportunities to enjoy the many benefits of healthy aquatic resources.

The Regional Fisheries Program Strategic Plan (plan) is an extension of the vision, describing more specifically the tactics to be implemented by the Northeast Region to fulfill the goals and objectives identified in the vision. The first plan covered years 2004 to 2008. The current plan (2009–2013) can be viewed at <http://www.fws.gov/northeast/fisheries/reports/reports/FisheriesStrategicPlan.pdf>

This plan brings together changing national direction, institutional knowledge, analysis of spatial information, and the perspectives of our state and tribal partners to develop a strategic plan that allows this regional program to prioritize its efforts during challenging times, while promoting positive change into the future. As the plan is implemented it will we build on a strong foundation of active partnerships and past accomplishments, while recognizing that continued communication, cooperation and expansion of partnerships is essential for successful implementation of this plan and fulfillment of the Program's resource

responsibilities and obligations. This plan was built off the lessons learned from implementing the 2004–2008 strategic plan, which was very broad.

One step-down effort resulting from the plan is the identification and ranking of fish and other aquatic species as to their level of conservation concern by hydrologic unit. We used this ranking and have consulted with the Regional Fisheries Program staff in developing aquatic objectives and strategies under goal 3, and in creating appendix A, “Species and Habitats of Conservation Concern on the Refuge and Other Refuge Species Lists.”

Virginia Wildlife Action Plan (October 2005)

In 2002, Congress created the State Wildlife Grant Program (SWG), and appropriated \$80 million in state grants. The purpose of the program is to help state and tribal fish and wildlife agencies conserve fish and wildlife species of greatest conservation need. The funds appropriated under the program are allocated to each state according to a formula that takes into account its size and population.

To be eligible for additional Federal grants, and to satisfy the requirements for participating in the SWG program, each state and U.S. territory was charged with developing a statewide “Comprehensive Wildlife Conservation Strategy” and submitting it to the National Advisory Acceptance Team by October 1, 2005. Each plan must address eight required elements, and each plan is to identify and focus on “species of greatest conservation need,” yet address the “full array of wildlife” and wildlife-related issues, and “keep common species common.”

The Virginia plan (VDGIF 2005), commonly referred to as the Virginia Wildlife Action Plan (VA WAP) resulted from that charge. It creates a vision for conserving Virginia’s wildlife and stimulates other states, Federal agencies, and conservation partners to think strategically about their individual and coordinated roles in prioritizing conservation.

In addressing the eight elements below, the VA WAP helps supplement the information we gathered on species and habitat occurrences and their distribution in our area analysis, and helps us identify conservation threats and management strategies for species and habitats of conservation concern in the CCP. The expertise convened to compile this plan and its partner and public involvement further enhance its benefits for us. We used the VA WAP in developing our list of species of concern in appendix A, and the management objectives and strategies for goals 1, 2, and 3. These are its eight elements:

- 1) information on the distribution and abundance of species of wildlife, including low and declining populations as the state fish and wildlife agency deems appropriate, that are indicative of the diversity and health of the state’s wildlife;
- 2) descriptions of locations and relative condition of key habitats and community types essential to the conservation of species identified in element 1;
- 3) descriptions of problems that may adversely affect species identified in element 1 or their habitats, and priority research and survey efforts needed to identify factors which may assist in restoration and improved conservation of these species and habitats;
- 4) descriptions of conservation actions necessary to conserve the identified species and habitats and priorities for implementing such actions;
- 5) plans proposed for monitoring species identified in element 1 and their habitats, for monitoring the effectiveness of the conservation actions proposed in element 4, and for adapting those conservation actions to respond appropriately to new information or changing conditions;

- 6) description of procedures to review the plan at intervals not to exceed 10 years;
- 7) plans for coordinating, to the extent feasible, the development, implementation, review, and revision of the plan strategy with Federal, state, and local agencies and Native American tribes that manage significant areas of land and water within the state, or administer programs that significantly affect the conservation of identified species and habitats; and,
- 8) plans for involving the public in the development and implementation of plan strategies.

The State of Virginia completed its final WAP, with no changes from its draft, in October 2005. You may view it at <http://www.vawildlifestrategies.org/draft.html>.

Other Information Sources

We also consulted the plans and resources below as we refined our management objectives and strategies, especially those with a local context.

Continental or National Plans

- Recreational Fishery Resources Conservation Plan; available at <https://www.denix.osd.mil/denix/Public/ES-Programs/Conservation/Fishery/fishery.html>
- National Wetlands Research Center Strategic Plan; available at <http://www.nwrc.usgs.gov/about/5-year-plan.htm>
- National Audubon Society Watchlist; available at <http://web1.audubon.org/science/species/watchlist/>

Regional Plans

- CHESAPEAKE 2000: A Watershed Partnership; available at: <http://www.chesapeakebay.net/pubs/agree99.PDF>
- Ducks Unlimited Conservation Plan; available at <http://www.ducks.org/Conservation/ConservationPlan/1516/InternationalConservationPlan.html>
- The Chesapeake Rivers Site Conservation Plan (TNC) ; available at: http://conserveonline.org/coldocs/2001/08/chesriv_plan.zip?searchterm=chesriv_plan
- Chesapeake Bay Lowlands Ecoregional Plan (TNC) ; available at <http://conserveonline.org/docs/2005/03/CBYplan.pdf>
- Partners for Wildlife Strategic Plan; available at: <http://ecos.fws.gov/docs/partners/web/pdf/783.pdf>

State Plans

- Business Plan for Environmental Education; available at <http://www.vanaturally.com/pdf/busplan.pdf>
- VA Outdoors Plan and/or Statewide Comprehensive Outdoor Recreation Plans (SCORP); available at http://www.dcr.virginia.gov/recreational_planning/vop.sht

Local Plans

- Northern Neck PDC: Cat Point Creek Watershed Management Plan 2004; available at http://www.dcr.virginia.gov/soil_&_water/documents/02-CatPointCreekWMP-2004.pdf

Individual Species Plans

- Atlantic Flyway Mute Swan Management Plan; available at <http://www.mdwfa.org/flyway/muteswanchesapeakebaymanagementplan.pdf>
- American Woodcock Management Plan; available at <http://permanent.access.gpo.gov/lps2111/nativefiles/harvest/wdckrept.html>
- Black Duck Joint Venture; available at <http://www.pwrc.usgs.gov/bdjb/bdjbvstpl.htm>

- King Rail Conservation Plan; available at http://www.fws.gov/midwest/MidwestBird/FocalSpecies/documents/Draft_King_Rail_Conservation_Plan.pdf
- Northern bobwhite conservation initiative; available at <http://www.bobwhiteconservation.org/>
- Sensitive Joint-Vetch Recovery Plan; available at http://ecos.fws.gov/docs/recovery_plans/1995/950929b.pdf
- American Shad and River Herring Fisheries Management Plan (spawning/nurseries); available at <http://www.asmf.org/speciesDocuments/shad/fmps/1985FMP.pdf>
- Final Recovery Plan for the Shortnose Sturgeon; available at http://www.nmfs.noaa.gov/pr/pdfs/recovery/sturgeon_shortnose.pdf
- Interstate Fishery Management Plan for Atlantic Sturgeon and its amendments and addendums; available at <http://www.asmf.org/speciesDocuments/sturgeon/fmps/fmps/sturgeonFMP.pdf>
- American Eel Fisheries Management Plan and addendum; available at <http://www.asmf.org/speciesDocuments/eel/fmps/eelFMP.pdf>
- Management Plan for the Atlantic Population of Canada Geese; available at http://www.mdwfa.org/flyway/CAGO_APMgmtPlanMarch2008.pdf
- Management Plan for the Eastern population of Tundra Swans; available at <http://www.mdwfa.org/flyway/FinalEPTUSWPlanJuly-07.pdf>
- Small-Whorled Pagonia Recovery Plan; available at http://ecos.fws.gov/docs/recovery_plans/1992/921113b.pdf

Refuge Establishing Purposes and Land Acquisition History

The refuge was established in 1996 for the following purposes and under the following authorities.

“for the development, advancement, management, conservation, and protection of fish and wildlife resources...” 16 U.S.C. §742f(a)(4), and

“for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude...” 16 U.S.C. §742f(b)(1) (Fish and Wildlife Act of 1956), and

“the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ...” 16 U.S.C. §3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act of 1986), and

“to conserve (A) fish or wildlife which are listed as endangered species or threatened species...or (B) plants...” 16 U.S.C. §1534 (Endangered Species Act of 1973), and

“for use as an inviolate sanctuary, or for any other management purpose, for migratory birds...” 16 U.S.C. §715d (Migratory Bird Conservation Act).

Map 1.1 above depicts the refuge ownership boundary as of September 30, 2007. Table 1.1 below summarizes the land acquisition history of the refuge by year.

Table 1.1. History of land acquisition at the Rappahannock River Valley refuge through September 30, 2007

Acquisition Date	Acreage	Funding Source
1996	1112	Donation
1998	41	LWCF ²
1999	2651	LWCF; Donation
2000	166	LWCF; MBCF ³
2001	860	LWCF
2003	686	LWCF
2004	1015	MBCF; LWCF
2005	1180	LWCF
2006	0	
2007	0	
Total	7,711¹	

¹The Service owns 6,352 acres in fee and 1,359 in conservation easement. Those acres are rounded to whole numbers; contact the refuge headquarters for precise acreages.

²LWCF—Land and Water Conservation Fund.—funding sources include revenues from the sale of surplus Federal real property, motorboat fuel taxes, fees for recreation on Federal lands, and receipts from mineral leases on the outer continental shelf.

³MBCF—Migratory Bird Conservation Fund.—the funding source is receipts from the sale of Federal Migratory Bird Hunting and Conservation Stamps.

Refuge Administration

We administer the Rappahannock River Valley refuge as part of the Eastern Virginia Rivers NWR Complex, which also includes the James River, Plum Tree Island, and Presquile refuges. The refuge complex headquarters is located in Warsaw, Virginia.

This refuge complex now has seven permanent staff: a refuge manager, deputy refuge manager, refuge wildlife biologist, administrative assistant, a visitor services specialist, refuge law enforcement officer, and one maintenance worker. Seasonal staff positions will vary between one and five each year. Six of the employees are stationed in Warsaw; one is stationed in Charles City, Virginia. The position at the Charles City sub-office assists in visitor services for the entire refuge complex, and manages the day-to-day operations at the James River, Plum Tree Island, and Presquile refuges.

Refuge Operational Plans ("Step-down" Plans)

Refuge planning policy lists more than 25 step-down management plans that may be required on refuges. Those plans contain specific strategies and implementation schedules for achieving refuge goals and objectives. Some plans require annual revisions; others require revision every 5 to 10 years. Some require additional NEPA analysis, public involvement, and compatibility determinations before we can implement them.

The status of step-down plans on the refuge follows. This plan incorporates by reference those that are up-to-date. Chapter 3 provides more information about the additional step-down plans needed and their schedule for completion.

The refuge now has the following seven step-down plans in place. We will update them as warranted for consistency with the final CCP.

- Fire Management—updated in 2009
- Public Deer Hunting—completed 2002
- Public Fishing—completed 2003
- Environmental Education—completed 2004
- Avian Influenza Contingency Plan—completed 2007
- Hurricane Action Plan—completed 2007
- Chronic Wasting Disease Plan—completed 2008

We plan to complete the following step-down plans (also see chapter 3).

- Habitat Management Plan (HMP; highest priority step-down plan, to be completed within 1 year of CCP approval)
- Annual Habitat Work Plan (AHWP) (to be completed annually after HMP approval)
- Safety Plan (to be completed within 1 year of CCP approval)
- Integrated Pest Management Plan (IPM; to be completed within 2 years of CCP approval)
- Inventory and Monitoring Plan (IMP; to be completed within 2 years of CCP approval)
- Visitor Services Plan (to be completed within 5 years of CCP approval)
- Law Enforcement Plan (to be completed within 5 years of CCP approval)



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Mt. Landing Creek

Refuge Vision Statement

Our planning team developed this vision statement to provide a guiding philosophy and sense of purpose in the CCP.

“On the Rappahannock River Valley National Wildlife Refuge, birds will raise their young in native habitats of field, forest, and marsh. They will find rest and nourishment during migration and a haven in winter. We will manage refuge lands and waters with an emphasis on species whose populations have declined, assisting them on the road to recovery.

“In partnership with others, we will contribute to the communities where we exist, helping renew the health and vitality of the Rappahannock River and the Chesapeake Bay. We will complement the rich traditions of hunting, fishing, forestry and agriculture on Virginia’s Northern Neck and Middle Peninsula.

“The refuge will serve as an outdoor classroom, where students of all ages will study nature’s complexity, contributing to our understanding and appreciation of the natural world and the National Wildlife Refuge System. All those who visit will find enjoyment in the presence of healthy and abundant fish, wildlife, and plants, and will leave with a renewed personal commitment to land conservation and stewardship.”

Refuge Goals

We developed these goals after considering the vision statement, the purposes for establishing the refuge, the missions of the Service and the Refuge System, and the mandates, plans, and conservation initiatives above. These goals are intentionally broad, descriptive statements of purpose. They highlight elements of the vision for the refuge that we will emphasize in its future management. The biological goals take precedence; but otherwise, we do not present them in any particular order. In Chapter 4, we describe the relationship between the goals, objectives, and strategies that we have developed.

Goal 1. Contribute to the biological diversity of the mid-Atlantic region by protecting, enhancing, and restoring the refuge’s upland habitats, with an emphasis on breeding, migrating, and wintering birds.

Goal 2. Maintain the long-term biological integrity of riparian habitats along the Rappahannock River and its tributaries for bald eagles and other migratory birds.

Goal 3. Maintain and enhance the biological diversity and environmental health of tidal and non-tidal wetlands to benefit Federal listed species, waterfowl, other migratory birds, fish and shellfish, reptiles, and amphibians.

Goal 4. Promote enjoyment and stewardship of our Nation’s natural resources by providing high-quality, wildlife-dependent recreational and educational opportunities on refuge lands and waters.

Goal 5. Communicate and collaborate with local communities, Federal and state agencies, and conservation organizations throughout the lower Rappahannock River watershed to promote natural resource conservation and the mission of the Refuge System.

Chapter 2



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Cat Point Creek

The Planning Process

- The Comprehensive Planning Process
- Issues, Concerns, and Opportunities

The Comprehensive Conservation Planning Process

Service policy (602 FW 3) establishes an eight-step planning process that also facilitates compliance with NEPA (figure 2.1). The full text of the policy and a detailed description of the planning steps can be viewed at <http://policy.fws.gov/602fw3.html>. We followed the process depicted below in developing this final CCP.

Since 1996, we have focused on conserving lands within the approved refuge boundary, facilitating wildlife-dependent public uses, managing habitat for several focus species, such as grassland birds and bald eagles, and establishing relationships with the community and our partners. In 2005, we began to prepare for developing a CCP by collecting information on refuge resources and mapping its habitats. We convened our core team, which consists of refuge staff, Regional Office staff, our VA Fisheries Coordinator, and representatives of the VDGIF. We discussed management issues, drafted a vision statement and tentative goals, and compiled a project mailing list of known stakeholders, interested individuals, organizations, and agencies. We also conducted a wilderness review, evaluated wild and scenic rivers potential, and summarized our biological inventory and monitoring information. We initiated all of those steps as part of “Step A: Preplanning.”

In November 2005, we started “Step B: Initiate Public Involvement and Scoping.” On November 1, we formally announced the start of the planning process in a Notice of Intent in the *Federal Register*. Also in November, we distributed a newsletter to approximately 310 individuals, organizations and agencies, announcing we were beginning the planning process and asking people if they wanted to remain on our mailing list.

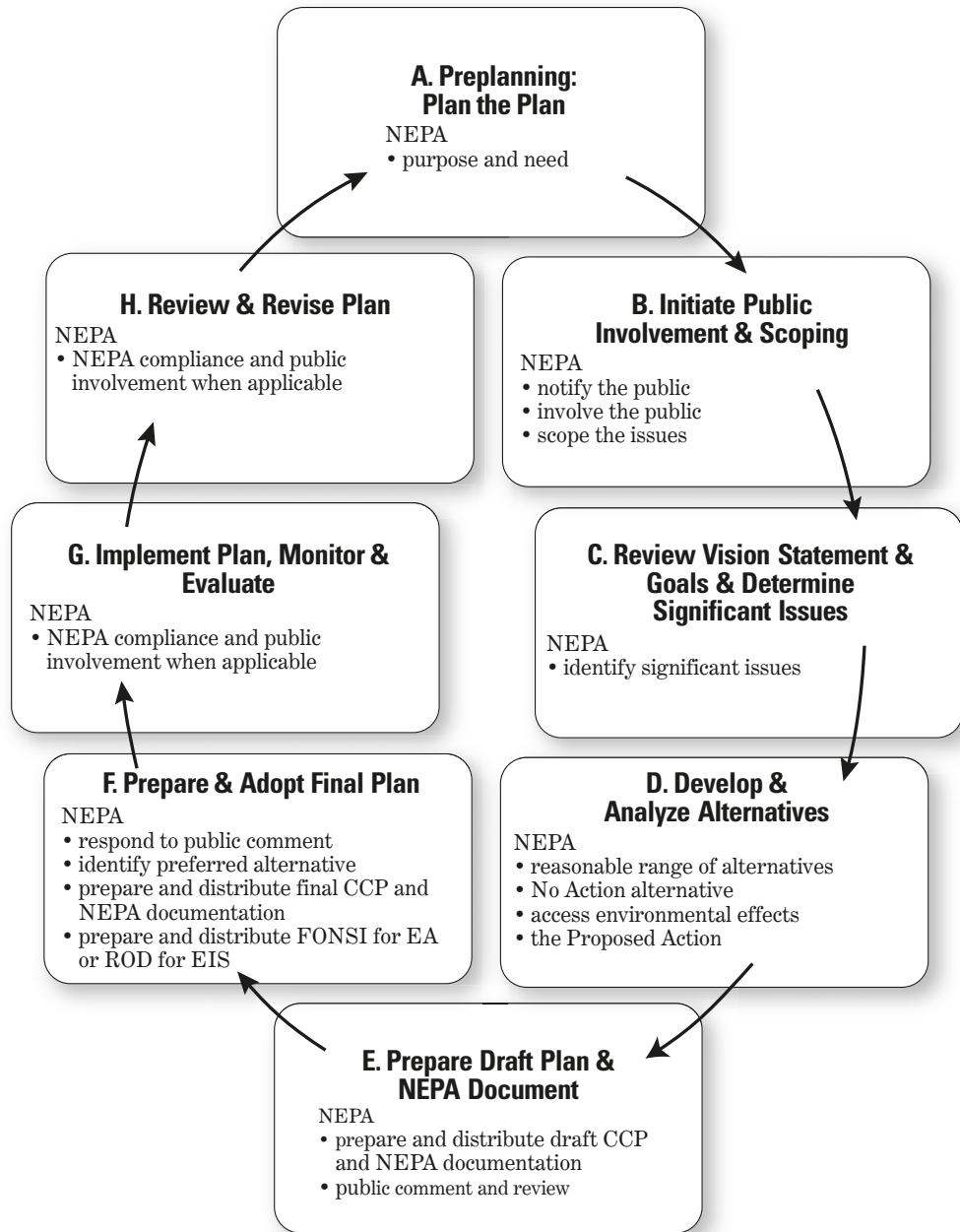
In December 2005, we distributed copies of a planning newsletter and issues workbook to everyone on that list. Those workbooks asked people to share what they valued most about the refuge, their vision for its future and the Service role in their community, and any other issues they wanted to raise. We received 32 completed workbooks.

Early in December, we held public scoping meetings in Richmond, Port Royal, and Warsaw, Virginia, to identify public issues and concerns, share our draft vision statement and tentative goals, describe the planning process, and explain how people could become involved and stay informed about the process. Those meetings helped us identify the public concerns we would need to address in the planning process. We announced their locations, dates, and times in local newspapers, in special mailings, and on our website. Forty-five people attended those public meetings. Since then, we have also solicited public issues and concerns regularly from individuals through visitor contacts, refuge-sponsored events, community-sponsored events in which the refuge participated, and answered invitations to speak to community organizations.

Throughout 2006, we worked on “Step C: Review Vision Statement, Goals, and Identify Significant Issues”. We held a technical workshop to seek advice from technical experts on what resources of conservation concern in the refuge planning area should be a management priority. We also met with elected officials, our state partners, and other Service divisions to apprise them of the status of the project and exchange technical information.

For much of 2006 and into 2007, we worked on “Step D: Develop and Analyze Alternatives.” We compiled and analyzed various management alternatives to serve as the foundation for developing the draft CCP/EA. We distributed to our mailing list and posted on our website a planning update newsletter in April 2006.

Figure 2.1. The Comprehensive Conservation Planning Process and its Relationship to the National Environmental Policy Act



That newsletter shared our goals, provided an update on CCP activities, and summarized the key issues we would address in this CCP

Also in 2006, the USGS Fort Collins Science Center helped us develop and implement a community survey to provide us with information on public satisfaction, preferences, and expectations regarding our current and proposed refuge management. We randomly selected more than 1,200 residences near the refuge to receive that survey questionnaire. The final report on the survey

provided valuable information for our management proposals. We distributed an executive summary of its results in October 2007; that summary appeared as appendix G in the draft CCP/EA. You may request the full report from refuge headquarters in print copy or on CD-ROM, or view it online at <http://www.fort.usgs.gov/products/publications/>.

In May 2007, we distributed another newsletter summarizing the three management alternatives we analyzed in detail for the draft CCP/EA. That completed Step D.

Our draft CCP/EA fulfilled “Step E: Prepare Draft Plan and NEPA document.” We published a Notice of Availability in the *Federal Register* on July 23, 2009 announcing its release for public review and comment. During the 35-day comment period from July 23 to August 28, 2009, we held two public meetings. We received comments by regular mail, electronic mail, and at the public meetings. Appendix G is a summary of the comments we received and our responses to them.

This CCP was submitted to our Regional Director for approval. He determined it warrants a Finding of No Significant Impact (FONSI; see Appendix H) and found its analysis sufficient to simultaneously issue his decision adopting this CCP. We announced his final decision by publishing a Notice of Availability in the *Federal Register*, where we also notified people of the availability of the CCP. This completes “Step F: Prepare and Adopt a Final Plan.”

“Step G: Implement Plan, Monitor and Evaluate” can now begin with approval of this CCP. As part of “Step H: Review and Revise Plan,” we will modify or revise the final CCP as warranted following the procedures in Service policy (602 FW 1, 3, and 4) and NEPA requirements. Minor revisions that meet the criteria for categorical exclusions (550 FW 3.3C) will require only an environmental action memorandum. As the Improvement Act and Service policy stipulate, we will review and revise the CCP fully every 15 years.



Ovenbird nest

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Leading Issues, Concerns, and Opportunities

We define an issue as “any unsettled matter requiring a management decision.” That can be an “initiative, opportunity, resource management problem, threat to a resource, conflict in use, or a public concern.” Issues arise from many sources, including our staff, other Service programs, state agencies, other Federal agencies, our partners, neighbors, user groups, or Congress. The following summary provides a context for the issues that arose during the planning process.

Habitat and Species Management

National wildlife refuges primarily promote the conservation wildlife and habitats. That is our highest priority, and serves as the foundation for all that we do. Many refuges were established for a very specific purpose, such as protecting a particular species or habitat. Based on the several purposes for this refuge, and the discussions that took place up to the time of its establishment, the primary justifications for creating it were protecting bald eagles and wetlands along the lower Rappahannock River, and protecting a regionally important waterfowl migration and feeding area.

How best to protect, restore, and or enhance wetlands and their associated species on the refuge is an important issue we address in this final plan. We heard many opinions on specific actions or techniques to accomplish that. Some of those suggestions fall outside our jurisdiction. Some we can accomplish best in partnership with other Federal or state agencies. Others expressed concerns that our current management (e.g., restrictions on public use and access to protect wildlife and habitats) was impinging on the public use and enjoyment of the river, and recommended a more conservative approach to setting refuge regulations.

Most of the refuge acreage is upland habitat. Our management of that acreage, which also can directly affect wetlands nearby, is also an important management concern. Many migratory birds of conservation concern depend on those upland habitats when breeding, wintering, or migrating. We heard a range of opinions on which habitat types we should emphasize and which Federal trust and state species of concern should be a management focus. Some of those recommendations, in particular those for grassland and early successional forest habitats, can be labor-intensive.

The following key issues and concerns arose concerning habitat and species management.

- What is the appropriate amount and distribution of grasslands habitat to manage on the refuge?
- Is there a role for cooperative farming on the refuge?
- How can we effectively and economically control invasive plants, which are affecting the quality of habitats we provide on the refuge?
- What are the most effective and efficient measures we can undertake to protect, restore, and conserve wetlands and riparian habitats on the refuge and throughout the lower Rappahannock River?
- Can we mitigate the predicted effect of global climate change through our habitat management?

Land Protection

Changes in land use and associated impacts that threaten the integrity of natural resources in the lower Rappahannock River area are increasingly a concern. Recently, we have observed lands that once provided contiguous habitat are being sub-divided, primarily into residential lots. Although local communities may desire some of that development, our level of concern rises when those areas destroy

or degrade important wildlife habitat, degrade water quality, restrict what was once public access to recreation areas, or spoil the rural landscape. In addition, those changes elevate the potential threat from invasive and exotic plants, which are becoming increasingly widespread and difficult to control. Our community survey revealed that, overall, community members are not in favor of increased development along rivers and streams.

Many organizations, including state and Federal agencies, are involved in protecting and conserving those qualities we mentioned on the lower Rappahannock River. We work with our conservation partners to identify sensitive wildlife habitat in need of protection or restoration. We also collaborate in outreach, education, research, and private landowner assistance. Service land acquisition, through either fee purchase or conservation easement from willing sellers, is one of the most important tools we use to conserve important areas of wildlife habitat. Up to 20,000 acres is approved for acquisition at the Rappahannock River Valley refuge. That land acquisition program garners a lot of public interest and attention. We heard directly from people who support our efforts to acquire and manage important habitat areas. Others were supportive as long as we allow public use and access on those lands. Some indicated a preference for the purchase of conservation easements, rather than purchase in full fee title. Others expressed concerns over the Service taking land out of the local tax base or taking agricultural land out of production. We address those concerns in our proposed management direction.

The following key issues and concerns arose about land protection and acquisition.

- How can we address community concern over the loss of agricultural land production through Service acquisition?
- How should we prioritize lands for acquisition within the approved acquisition boundary? Do the original acquisition priorities (1996 EA) reflect our current priorities? Should predictions of climate change affect our decisions?
- How do we manage the conservation easements purchased for the refuge? In future easement acquisitions, what rights should the Service purchase?

Public Use/Community Relations

Our goal is to become an integral part of the socioeconomic health and quality of life of the communities we affect. The challenge for us is to understand the visions of the respective communities and our role in them while adhering to our mission. We also need to determine how best to nurture and cultivate the mutually beneficial relationships we have developed using the resources we have available.

During public scoping, and because of our community survey, we learned that many people are vaguely aware of the refuge, but are not particularly knowledgeable about the opportunities and services we offer. Others mentioned that they are noticing an increase in public awareness because of our refuge events and programs, and media attention. Some suggested ways we might conduct additional outreach. Others recommended additional recreational activities desired in the local communities. To them, providing more recreational opportunities was the best way to increase community interest and involvement in the refuge. Finally, some who felt well informed and satisfied about refuge activities valued the contribution of the refuge to the community and their quality of life.

In response to those comments and the issues below, we evaluated a range of quality, wildlife-dependent recreational opportunities, and have proposed measures to promote Service visibility, community understanding and support for refuge programs.

The following are key issues or concerns that arose about public uses and community relations.

- How do we effectively conduct outreach to explain our regulations on beach use on the river?
- What administrative facilities, such as an office, visitor contact facilities, and roads are needed to manage the refuge, and where should they be located?
- How do we improve the visibility of the Service and the refuge in the local community?
- How can we deal with the potentially negative impact of roaming hunting dogs on wildlife, visitors, and neighbors?
- What other opportunities can we provide for compatible, priority, wildlife-dependent public uses?

Chapter 3



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Great spangled fritillary

Existing Environment

- Introduction
- The Physical Landscape
- The Cultural Landscape Setting and Land Use History
- Current Climate
- Air Quality
- Water Quality
- Regional Socio-Economic Setting
- Refuge Administration
- Special Use Permits, including Research
- Refuge Natural Resources
- Refuge Biological Resources
- Refuge Visitor Services Program
- Archeological and Historical Resources

Introduction

This chapter describes the physical, biological, and social environment of the Rappahannock River Valley refuge. We provide descriptions of the physical landscape, the regional setting and its history, and the refuge setting, including its history, current administration, programs, and specific refuge resources. Much of what we describe below reflects the refuge environment as it was in 2007. Since that time, we have been writing, compiling and reviewing this document. As such, some minor changes likely occurred to local conditions or refuge programs as we continued to implement under current management. However, we do not believe those changes appreciably affect what we present below.

The Physical Landscape

Watershed

Our project area is part of the Chesapeake Bay watershed, a drainage basin of 64,000 square miles encompassing parts of the states of Delaware, Maryland, New York, Pennsylvania, Virginia, West Virginia, and the District of Columbia. The waters of that basin flow into the Chesapeake Bay, the nation's largest estuary.

The watershed contains an array of habitat types, including mixed hardwood forests typical of the Appalachian Mountains, grasslands and agricultural fields, lakes, rivers, and streams, wetlands and shallow waters, and open water in tidal rivers and the estuary. That diversity supports more than 2,700 species of plants and animals, including Service trust resources such as endangered or threatened species, migratory birds, and anadromous fish (www.fws.gov/chesapeakebay/coastpgm.htm).

The Rappahannock River is one of several rivers that flow into the western-side of the Chesapeake Bay; others are the Potomac, York, and James rivers. The Rappahannock is the geographic feature that defines the heart of our project area. The river journeys 185 miles from its source in Chester Gap, a mountainous region near Front Royal, Virginia, to its mouth where, at 3.5 miles wide, it flows into the bay.

Although the entire Rappahannock River watershed comprises about 2 million acres, our project area includes only its lower reaches, near where it enters the bay (see chapter 1, map 1.1). The upstream boundary of our project area starts below Fredericksburg, Virginia, and includes the geographic regions often referred to as the Middle Peninsula and Northern Neck, encompassing the river shore up to the drainage divides on each side. The downstream boundary of our project area ends around Belle Isle State Park. Our entire project area, excluding the river, is approximately 268,000 acres.

Notable Physiographic and Landform Features

Geomorphic regions or “physiographic provinces” are broad-scale subdivisions based on terrain texture, rock type, and geologic structure and history. Our project area lies in the Virginia portion of the Atlantic Coastal Plain delineated by USGS (<http://tapestry.usgs.gov/physiogr/physio.html>). The Virginia Department of Game and Inland Fisheries (VDGIF) (VDGIF 2005) also uses that regional delineation in their wildlife action plan. The Virginia coastal plain consists of a series of terraces sloping downward toward the coast, with each terrace or scarp representing a former shoreline (Wilson and Turbeville 2003). It is the youngest physiographic province in the state, and consists of sedimentary deposits of sand, clay, marl, and shell. Its principle characteristics are its low topographic relief (except for occasional steep ravines), extensive marshes, and tidally influenced rivers and creeks.

The “Fall Line” separates the Virginia coastal plain physiographic region from the Appalachian Piedmont physiographic region to the west. That line is a low, east-facing cliff that extends from New Jersey to the Carolinas, parallel to the Atlantic coastline. It separates the hard, Paleozoic metamorphic rocks of the Appalachian Piedmont on the west from the soft, gently dipping Mesozoic and Tertiary sedimentary rocks of the Coastal Plain on the east. That erosional scarp, the site

of many waterfalls, hosted flume- and water-wheel-powered industries in Colonial times, and thus, helped determine the location of such major cities as Philadelphia, Baltimore, Washington, and Richmond. Fredericksburg marks the Fall Line on the Rappahannock River.

The Virginia Natural Heritage Program (VNHP) further subdivides the coastal plain region into “northern,” “southern,” “inner” and “outer” Virginia coastal plain to account for the rich variety and distinction of natural community types in the area (http://192.206.31.52/cfprog/dnh/naturalheritage/select_prov.cfm; Wilson and Turbeville 2003).

Those distinct natural community types are the result of local landforms and geographic features that may appear subtle, but vary widely across the landscape. From the main driving routes along either side of our project area boundary (routes 3 and 17), the topography of two major landforms, the Northern Neck and Middle Peninsula, would appear to casual observers as flat to gently rolling.

Although that is true along the roads where farm fields are visible, beyond the fields in the direction of the Rappahannock River or the many creek drainages, observers can see a dramatic change in topography. The highly erodible soil layers give way to steep ravines, some of which plummet to depths of 80 feet or more. That is particularly true of the Fones Cliffs section of the river, where the shoreline is breaching the Essex scarp soil type, creating steep-faced cliffs of about 100 feet.

Both the flat uplands and the network of steep ravines are geomorphic features that dictate the character of the Northern Neck and the Middle Peninsula. The flat uplands are dominated almost entirely by anthropogenic uses such as crop agriculture, pine plantation, and landscaping nurseries, leaving very little natural forest.

On the other hand, the rough terrain of the ravines prohibited substantial logging, farming or development. As a result, those areas tend to be shady, forested, and often contain spring seeps or perennial streams that eventually flow into the river. They have become their own microcosm of plant and animal communities, quite distinct from the surrounding uplands.

The rich topography of the Northern Neck and Middle Peninsula supports some unique or increasingly rare vegetation and significant natural communities. The Nature Conservancy (TNC) of Virginia’s Chesapeake Rivers Site Conservation Plan identifies some of these as targets for conservation (TNC 2001). We utilized this document and other TNC and VDGIF data to help us assess the biological diversity and integrity of the refuge’s habitats, and consider their contribution to those values across the larger landscape. Service policy (601 FW 3) requires us to consider the biological diversity, integrity, and environmental health of refuge lands during the CCP planning process to ensure the protection of a broad spectrum of fish, wildlife, and habitat resources within refuge ecosystems, to prevent additional degradation of environmental conditions, and to evaluate the potential to restore lost or severely degraded components of the environment. Natural community areas of conservation concern that occur, or could occur, in the refuge area include bald cypress forests, seepage wetlands, calcareous forests, and fluvial terrace woodlands. Large blocks of terrestrial upland forests and tidal freshwater ecosystems also occur there. A detailed description of those natural communities can be found in the Virginia Natural Heritage Program (VNHP) First Approximation classification of ecological community groups of Virginia, or through personal communications with Natural Heritage ecologists (TNC 2001).

The VNHP also identifies ecologically important sites in or next to our project area, many of which are similar to the TNC plan. Three hundred forty-eight conservation sites and stream conservation units have been mapped in this

physiographic region (Wilson 2003). Conservation sites are the locations of a natural resource element of conservation concern (e.g., an endangered plant or animal species). For elements that inhabit streams, rivers, or other large bodies of water, the boundary is called a stream conservation unit.

Those likely to be found in our project area include coastal plain calcareous forest and woodland, fluvial terrace woodland, coastal plain/piedmont bottomland forest, floodplain pond and pool, coastal plain depression pond, non-riverine wet hardwood forest, coastal plain basic seepage swamp, tidal shrub swamp, tidal bald cypress forest and woodland, and tidal hardwood swamp. Another natural community not listed in the plan, but believed to be important from a unique ecological and biological diversity standpoint, is coastal plain acidic seepage swamp, which is associated with sand deposits (Allen Beldon, DNH, personal communication 2004).

Major Historical Influences Shaping Landscape Vegetation

Estimating what the historic natural vegetation types were, how they were distributed, and what ecological processes influenced them prior to major, human-induced disturbance, can help us evaluate future management options. However, many ecologists caution against selecting one point in time, and instead, recommend evaluating the “historical range of variation” for each habitat type.

According to noted ecologist Robert Askins of Connecticut College, “This approach recognizes that the proportions of grassland, shrub land, young forests, and old-growth forests have shifted constantly over the past few thousand years as the climate changed and people have modified the land by hunting, burning, and farming. Preserving the biological diversity of any region requires a range of habitat types, including those created by natural disturbances. If there are no natural or artificial disturbances generating grassland, shrub lands, and young forest, then not only will early succession obligates be in trouble, but so will mature forest specialists that use early succession habitats at key points in their life cycles. Only large public lands like refuges, parks, preserves can sustain the full range of early succession and forest habitats, so in most regions land managers will need to cooperate to ensure that these habitats are adequately represented across the regional landscape” (Askins 2002).

A brief summary of influences on natural vegetation patterns across the landscape follows.



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Barn swallow nest

Pre-History Influences

Ten to twenty million years ago, the Chesapeake Bay region was a place of grasslands and shallow coastal waters, evidenced by the fossil record preserved in Maryland's Calvert Cliffs. That gradually gave way to spruce forests and marshy tundra as the ice age of the colder Pleistocene period began 2 million years ago (Grumet 2000). Sea levels rose and fell with the advance and retreat of each of the four ensuing ice ages, causing the coastal plain to extend eastward, at least 100 miles farther than the present day shoreline. Each melting glacier deposited vast sheets of sand, silt, gravel and clay. Those weathered into deep layers of acidic, sandy or silty soils of light to medium texture, which rain easily penetrated.

In addition, river and seawater formed vast underground aquifers that today lie from several hundreds to more than 1,000 feet deep along the western and eastern shores of the bay (Grumet 2000). The Wisconsin Glaciation was the last glaciation which retreated from its maximum extent 18,000 years ago. At that time, the bay region was a branching network of rivers and streams traversing a rolling terrain about 300 feet above present-day sea level (Grumet 2000).

Humans (Paleo-Indian) made their first appearance in the region between 18,000 and 11,500 years ago. Evidence from carbon 14 and other radiometric tests of

cores drilled into ice age lakes and swamps, such as the Great Dismal Swamp, suggest a colder, wetter, and largely flooded coastal plain at that time. The evidence also shows that massive climatic changes transformed the region during Paleo-Indian times, particularly in the transition from softwood to hardwood forests on the upland portions of the Coastal Plain (Grumet 2000). Bones, teeth, and horns found in coastal plain soils indicate that present-day wildlife residents, such as white-tailed deer, beaver, and black bear, lived side by side with mammoths and mastodons (Grumet 2000), caribou, long-nosed peccaries, and sharp-tailed grouse, a species now associated with the western prairie (Askins 2002). Even sea mammals such as walruses and seals thrived in the seas that periodically covered the Coastal Plain (Grumet 2000).

Soil strata and coatings of ash on tree rings indicates that Paleo-Indians used fire, but that did not significantly alter the larger trend of forest transformation from softwoods to hardwoods as the last Ice Age withdrew (Grumet 2000). Beginning about 10,000 years ago, oak-hickory forests began to dominate in the east as climatic conditions became increasingly warm and dry. The coastal plain continued to extend far beyond its current shoreline, but as glaciers melted and sea levels rose, the inward progression of the sea coupled with an uprising of about 160 feet of coastal plain uplands. Rising sea levels caused considerable widening of the rivers in the Chesapeake Bay ecosystem about 8,000 years ago. In the parts closest to the ocean, the rivers changed into tidal estuaries, which widened further between 5,000 and 3,000 years ago and formed what is now the Chesapeake Bay (Grumet 2000).

The continued moderation of the region's climate encouraged the growth of mixed hardwood forests. It promoted conditions under which freshwater wetlands and low salt marshes could form, and submerged aquatic vegetation could thrive and support anadromous fish, migratory shorebirds and waterfowl. Fire (whether natural or started by humans) and drought during this period created park-like woodlands and stretches of open grasslands throughout the bay area (Grumet 2000). This is the setting in which eastern Native American cultures grew and thrived, and which facilitated English settlement.

More Contemporary Influences on Vegetation Patterns

The upland forests that originally covered much of the Virginia coastal plain have been so extensively and intensively altered or cleared that it is difficult now to determine with any certainty which species were most prevalent (Fleming 2006). We describe in the next section some of the human activities that caused the current vegetation composition. Pine and oak now dominate much of the forests, but those are early to mid-successional species that probably attained dominance because of their adaptability to fire and other disturbance (Abrams and Black 2000).

Forest succession on the coastal plain typically involves pine, followed by early successional hardwoods, then later successional hardwoods. Pine species also invade old fields after agricultural abandonment, but later successional, shade-tolerant tree species will then increase in dominance in uplands where fire has been suppressed. Black gum and American holly (*Ilex opaca*) are examples of such species. Older stands of black gum, a fire-sensitive species, indicate a long period of fire suppression (Abrams and Black 2000). Sweetgum is also an early invader of old fields, but loses dominance over time from heavy mortality, due to its shade-intolerance. It can grow to be a canopy-dominating tree during the late-succession phase (Abrams and Black 2000). Tulip-tree invasion occurs in high abundance in forest stands disturbed by timbering and logging, but very little in abandoned fields. Unlike the adjacent Piedmont region, the endpoint of old-field succession in the Virginia coastal plain is not oak-hickory, but would more likely resemble the beech and white-oak rich southern mixed hardwood forests farther south (Monette and Ware 1983).

Much of the contemporary forest on the uplands in our project area consists of successional or silvicultural stands of loblolly pine or the secondary pine-hardwood forests that follow agricultural abandonment. This supports the premise that the project area and surrounding landscape has undergone extensive, continued disturbance except in the less accessible areas, such as bottomlands and ravines, where later succession stands have established.

Alternating periods of drought-like years, years of high rainfall, or occasional hard winters, are the climatic conditions that have had the most far-reaching impacts in the project area and the Chesapeake Bay watershed. Each of those conditions has its respective effect on the landscape, primarily in instigating flooding and wildfires, which historically were the principal natural ecological processes influencing the type, age classes, and distribution of natural community types. The project area is not as affected by hurricanes as lands farther south, nor by tornados as in the mid-west, although severe weather can deliver spikes in rainfall and high winds here that lead to localized flooding and tree damage.

Over the past 54 years the average maximum temperature was 68.7°F, while the average minimum temperature was 47.0°F. The average total precipitation in inches over the same years was 43.3 (Southeast Regional Climate Center; <http://radar.meas.ncsu.edu/cgi-bin/sercc/cliMAIN.pl?va8894>; accessed August 14, 2007). In 2004–2007, record-breaking heat waves have reached temperatures as high as 102°F, as in August 2007.

Flood information over the last 50 years for the three counties that contain most of the refuge tracts—Essex, Richmond, and Westmoreland counties—show two major floods in Richmond County in July 1995 and September 1999. Essex County experienced three floods from 1994 to 1999. Four floods were reported for Westmoreland County from 1999 to 2004, including the flooding from Hurricane Floyd in 1999 (National Climatic Data Center, (<http://www4.ncdc.noaa.gov/cgi-win/wuwcgi.dll?wwevent~storms>; accessed March 27, 2006).

Between 1997 and 2007, several droughts occurred in the project area for the same three counties. Richmond County experienced drought-like conditions from July through November 1998. Essex County experienced a dry period from May through September 1997, and Westmoreland County experienced drought that same year from July through November. Dry conditions prevailed throughout our project area in the summer and fall of 2002, although they were not listed in the National Climatic Data system, followed by a record wet season from April to June 2003 (NCDC 2006). Another dry period occurred in 2007.

Hurricane Isabel struck the project area in September 2003 with sustained wind speeds of 40 to 60 mph. The ensuing storm surge pounded and flooded the north- and northeast-facing shorelines of the Northern Neck and Middle Peninsula, destroying residences and businesses. It blew down thousands of trees across the western side of the Chesapeake Bay. Approximately 10,000 trees fell in the city of Richmond (Richmond Times Dispatch, Sept. 28, 2003). Foresters and other scientists suggested that more trees fell than expected because of root damage caused by the 2002 drought, which weakened the root systems, and because of the heavy rains of 2003, which loosened the soils (Richmond Times Dispatch, 2003; Watts 2003, personal communication). The trees succumbed to the long duration of wind pressure and the resulting storm surge.

Hurricane Ernesto had become a tropical depression by the time it arrived in Virginia in September 2006, but it held sustained winds of about 60 mph, damaging homes, shorelines, and trees. The tree loss due to storms is likely a normal event;

however, ever-dwindling habitat amplifies the loss of bald eagle nesting and roosting territory due to storms.

Spring 2004 was abnormally cool and rainy, which may account for the poor seed crop of American holly and eastern red cedar throughout the Northern Neck in the winter of 2004–2005 (Spencer personal observation), as extremely damp conditions can cause poor pollen viability and decreased seed production.

No major wildfires are listed for the three major counties in the refuge project area in the past 50 years. However, the first few months of 2006 witnessed a prolonged period of drought-like conditions that prompted state authorities to issue red-flag fire warnings and burn bans. Several small wildfires ignited throughout central and northern Virginia, Northern Neck, and Middle Peninsula in February and March (Spencer, personal observation; and, general news media). Drought like conditions and wildfires hazards also occurred in 2007.

The Cultural Landscape Setting and Land Use History

Early Native American and European Influences

During the Late Woodland Era (about 1,100 years ago), a variety of southern mixed hardwood forests grew in the Coastal Plain, containing giant trees hundreds of years old forming a closed canopy and an open understory. Native American populations began to live in larger communities around this time, and large villages appeared, supported by the farming of beans, squash, and corn. Most were situated near sources of water and fertile soils. Where forests grew on fertile land, trees and vegetation were cut and burned to make crop fields. Certain plants were allowed to grow between cultivated mounds, which helped hold the soil in place, reduce erosion, and divert bird and insect pests.

The growing population likely affected the natural biological community greatly through hunting, farming, clearing land, and starting fires. In the borderlands between chiefdoms, dense undergrowth likely flourished and was used as game preserves, and the trails and corridors connecting those with settled areas increased the heterogeneity of the landscape (Grumet 2000; Hammet 1992). Algonquin Indians lived on the Northern Neck from 1300 to 1650, and early Europeans documented their slash and burn agriculture and selective burning as common practices (Abrams and Black 2000).

At the time of European contact, the forest landscape in much of the east contained open stands of trees and some savannahs (Davis 1981) shaped by short-interval, low-intensity fires. Fire-influenced oak-hickory forests in Virginia were prevalent (Orwig and Abrams 1994, Kirwan and Shugart 2000).

Mature old growth forests covered as much as 95 percent of the Chesapeake Bay region in 1500, but by 1775, European colonists had cut and burned as much as 30 percent of the coastal plain forests (Grumet 2000). During the 18th and 19th centuries, 70 percent to 80 percent of the original forest cover was cleared in the Chesapeake Bay area (Langdon and Cronin 2003). Not only were forests felled for farmland and pastureland, but also for firewood, fencing, construction and the ever-increasing demand for iron furnaces, which needed wood for charcoal.

The most significant impacts from European settlement on regional vegetation were cash crops like tobacco and the introduction of Old World field crops. Tobacco quickly depleted soil fertility and growing it had to be abandoned. Abandoned farmsteads left a depleted landscape, which allowed for the massive invasion of weeds and pests. Contemporary accounts describe increasing erosion and sedimentation clouding the region's rivers. Because of the high demand for timber, and without a sustainable harvesting program to ensure an adequate supply of seed trees and the recruitment of host species, young pines and grasses took over where

mature oaks, hickories, and other valuable tree species once stood. Free-ranging cattle, horses, and hogs that fed on woody plants, young saplings, grasses, and mast further compounded those impacts on forests. Overgrazing was a major problem by 1820. The colonial population grew from 700,000 in 1775 to more than 1.3 million by 1820, while Native American populations shrank to fewer than 500 individuals living in rural enclaves in unwanted swamplands and pine barrens (Grumet 2000).

Agriculture and commerce continued to dominate the regional economy in the early 1800's. Maneuverable flat-bottomed sailing ships and barges capable of navigating shallow, winding waters carried cargoes through the Coastal Plain waterways. Farther inland, wagons drawn by horses and oxen continued to haul commodities. However, both soil exhaustion and the increasing local demand for fresh farm produce convinced many tidewater farmers to switch from cultivating tobacco intensively to producing a wider variety of agricultural products.

At this time many important advances were made in agricultural technology (Thomas Jefferson's moldboard plow, John Binn's gypsum and Edmund Ruffin's marl soil fertilizers) which further fueled the region's economy and population growth. The population and distribution of plants and animals changed significantly during this period. Beaver, white-tailed deer, black bear, wild turkey, and songbird populations declined as farmers destroyed their habitats and hunters thinned their numbers. The effects spread westward as pioneers, traveling on the ever-expanding network of new roads and turnpikes threading the region, transformed forests into fields (Grumet 2000).

Wood remained the nation's primary material for light, heat and construction until the 1860s, but the late nineteenth to early twentieth centuries brought unprecedented transformations to all aspects of life in this region, with the advent of coal, steel, steam, and industrial expansion. During that period, many factors radically transformed the environments in Chesapeake Bay: industrialization, urban growth, and shifts in agricultural production, gas engines, coal mills, electrification, and transportation improvements. New crops were introduced and old ones were farmed in new ways. Wheat began to supplant corn and tobacco as the major cash crop. The country's growth meant more agriculture, industry, and residential communities, more demands on the water supply, more sewage, pollution, and erosion into Coastal Plain waters and skies. By the 1870s, the steep declines in the Bay's oyster, crab, and other fisheries began to alarm fish and wildlife officials.

Cultural Influences over the past 100 years

By 1900, less than 30 percent of the original forests remained in the Chesapeake Bay watershed. The chemical alteration of the soils from clear-cutting also made it harder for young trees to reclaim logged tracts, especially in hilly areas, and foreign tree diseases, such as Dutch elm and chestnut blight, began to appear. People also drained wetlands to create more farmlands and destroy the breeding grounds of mosquitoes and other insect pests. Such activities also changed the composition of tidewater forests. Two bird species that once thrived in the region became extinct in the early 1900s: the Carolina parakeet and the passenger pigeon (Grumet 2000).

By 1930, the regional population reached 5 million. In rural areas, farming advanced again with new reapers, tractors, fertilizers, and pesticides. Ironically, the Great Depression of the 1930s actually spurred rural development by bringing New Deal public work projects, such as dams, highways, bridges, and rural electric lines into the bay area and the nation, but much more growth occurred because of the post-World War I economic revival. Intensive development, spurred by population growth and changing real estate values, has changed as much as 70 percent of the total land area in regional metropolitan centers. Overall, agricultural, residential, and industrial development has affected more than 40 percent of all lands in the region. The 1.2 million acres of wetlands remaining in the region today represent only a fraction of their former acreage (Grumet 2000).

Current Climate

General Climate Description

The climate of the lower Rappahannock River Valley is humid subtropical, as determined by latitude, topography, prevailing westerly winds, and the influence of the Atlantic Ocean (Commonwealth of Virginia 1988). The prevailing winds are westerly, with highest wind speeds in the spring (Robinette and Hoppe 1982). Average annual precipitation is approximately 43 inches, with approximately 3–4 inches average monthly rainfall throughout the year. The average temperature ranges from 55°F to 58°F, with a growing season that generally lasts between 185 and 229 days (McNab and Avers 1994).

Global Climate Change

Global climate change is a significant concern to the Service and to our partners in the conservation community. Scientists are predicting dramatic changes in temperature, precipitation, soil moisture and sea level, and an increased frequency and magnitude of storm-surge flooding and coastal erosion due to storms, all of which could adversely affect the function of ecological systems and modify vegetation and wildlife distributions (US CCSP 2009). We expect that species' ranges will shift northward or toward higher elevations as temperatures rise, but responses likely will be highly variable and species-specific. Under those rapidly changing conditions, migration, not evolution, will determine which species are able to survive (USFWS 2006). Species that cannot migrate will suffer the most. For example, plants, mussels, and amphibians are more vulnerable to shifts in temperature that may affect their ability to survive, grow, and reproduce.

Sea-level rise is one of the most potentially serious consequences of global climate change on coastal ecosystems such as the Chesapeake Bay, including the lower Rappahannock River. Stevenson, of the University of Maryland, has described the ecological collapse of the Chesapeake Bay tidal wetlands as result of sea level rise (Stevenson et al. 2002). Sea level rise is particularly high in the Chesapeake Bay due to natural geological subsidence and groundwater extraction, in addition to global climate change. Tidal wetland collapse occurs when marsh grasses cannot build up fast enough to keep abreast of rising sea level in locations where inorganic sediment inputs are low. This impact will be exacerbated by the predicted increased frequency and magnitude of storm-surge flooding and coastal erosion due to storms in response to sea-level rise. Eventually, plant productivity decreases because excessive submergence effectively drains carbon reserves, thereby reducing peat formation and converting marshes to un-vegetated mudflats. Moreover, a rise in ambient temperature, in part from global warming, reduces oxygen concentrations in the water column of eroded marsh embayments, rendering them poor habitat for most fish and shellfish species (Stevenson et al. 2002).

Rising sea level also has the potential to cause saltwater intrusion into estuaries and threaten freshwater resources. Sea-level rise allows saltwater to penetrate further upstream and inland into wetlands, bays, and rivers affecting salinity levels and, in turn, the types of wildlife, fish and plants that can persist there (Titus et al. 1991). For example, increases in salinity due to sea-level rise have likely decreased oyster harvests in the Delaware Bay (Titus et al. 1991). Saltwater intrusion, due to extensive groundwater extraction, is also a concern for coastal freshwater supplies, as it can decrease the amount of freshwater stored in aquifers, and in extreme cases, result in the complete loss of an aquifer (USGS 2008).

Blackwater Marsh, part of Blackwater National Wildlife Refuge, exhibited a major marsh collapse. It was once the most extensive marsh area of Chesapeake Bay, but due to sea-level rise, localized invasive nutria (*Myocastor coypus*) damage, and other environmental factors approximately 5,680 acres were lost to open water from 1938 to 1979 (Stevenson et al. 2002). This resulted in an export of more than 719,000 metric tons of organic sediment per year to surrounding waters (Stevenson



USFWS

Fall colors on the refuge

et al. 1985). Furthermore, the loss of fringe marshes was documented as driving up the amount of nitrate in groundwater entering the bay by reducing the denitrification at the land/sea interface. Thus, marsh losses and erosion will make the nutrient cleanup of Chesapeake Bay area all the more difficult in the future. The highly organic sediment resulting from eroding tidal marshes presents problems for submerged aquatic vegetation (SAV) downstream. As sea-level rise advanced rapidly in the 1990s (>0.4 inches per year, representing a transitional rate) SAV beds in the center of the bay also declined, in part due to increased sedimentation from marshes nearby. The loss of SAV beds is a huge impact on the ecology of the bay. SAV beds represent a critical habitat component for such species as waterfowl, fish, and other aquatic species, including the economically important blue crab (Stevenson et al. 2002). We provide additional details on the importance of SAV in our water quality discussion, below.

Massive marsh collapse and erosion also has been documented in Delaware Bay and other parts of the Mid-Atlantic coastline, where incoming sediment supplies are limited and sea level rise is significant (Kearney et al. 2002). Our concern is that those adverse impacts, with the exception of nutria which are not present on the refuge, are likely to be similar in the tidal marshes of the Rappahannock River. Refuge uplands generally are much higher in elevation and not as susceptible to sea-level rise as marshes at or near current sea level. However, if saltwater intrusion increases, coupled with sea-level rise, then there is the potential to kill standing trees and other vegetation at higher elevations. While we have not established a baseline monitoring program to track global climate change impacts, we hope to work with our partners throughout the area to begin such a program.

Air Quality

The Virginia Department of Environmental Quality (VA DEQ) monitors levels of ozone and particle pollution from several stations in Virginia. The Air Quality Index is a measurement of air quality that is calculated from measurements of those pollutants over several hours. A higher rating indicates a higher level of air pollution and, consequently, a greater potential for health risk. Since no monitors are located in the immediate vicinity of the refuge, we are using the data for Caroline County (located to the north) and the Richmond area (located to the south) for the evaluation of refuge air quality. In Caroline County, in 2005, air quality monitors recorded two instances when ozone concentrations exceeded

84 parts per billion, the health-based air quality standard. The Richmond area monitor recorded nine instances (www.deq.state.va.us/air/homepage.html)

The U.S. Environmental Protection Agency (EPA) collects emissions data for three criteria air pollutants—carbon monoxide, sulfur dioxide, and particulate matter—and three precursors/promoters of criteria air pollutants—volatile organic compounds, nitrogen oxides, and ammonia. That data is summarized in the Air Quality System database, the EPA repository of criteria air pollutant monitoring data, which reports the number of days when air quality was good, moderate, unhealthy for sensitive groups, or unhealthy, by station and county (counties with air quality monitoring stations).

The following data was collected in 2005 from these counties: Caroline County—82 percent good, 16 percent moderate, and less than 1 percent unhealthy for sensitive groups (0 unhealthy days); and Henrico County—61 percent good, 37 percent moderate, and 1 percent unhealthy for sensitive groups (0 unhealthy days) (www.epa.gov/air/data).

Please note that the data above from Caroline County to the north and the Richmond area to the south, including Henrico County, also include the cities of Richmond and Fredericksburg, where populations are considerably higher and pollution emission sources are more numerous than in the refuge area. Although those emissions affect the air quality of the refuge area, we may surmise that air quality improves in this area of lower vehicle usage and fewer emission sources.

The Class I air quality area closest to the refuge is Shenandoah National Park, which, at its closest point lies 65 miles northwest of the refuge. That national park has one of the most comprehensive air quality monitoring and research programs of all national parks and wilderness areas that are afforded special protection under the Clean Air Act. Over the last 20 years, monitoring and research show that the park's air quality has severely degraded its scenic and most sensitive aquatic resources. Furthermore, the park's air quality does not currently meet the 8-hour ground-level ozone standard set by the EPA to protect public health and welfare. A technical report from the Park Service provides a detailed assessment of air quality and related values in the park (USDI May 2003). However, please note that the park's geographic location, coupled with the prevailing winds, results in no direct influence on the air quality at the refuge.

Water Quality

Summary of the General Condition of the Rappahannock River Basin

The entire Rappahannock River Basin covers 2,715 square miles, or approximately 6.8 percent of Virginia's total area. Two USGS hydrologic units (HUCs) compose the basin: HUC 02080103—Rapidan—Upper Rappahannock; and HUC 02080104—Lower Rappahannock. Those two hydrologic units are divided further into 26 bodies of water or watersheds.

The tidal influence extends to the Fall Line in Fredericksburg and up many of the creeks in the Lower Rappahannock HUC. Its last dam, the Embrey Dam, located a couple of miles above Fredericksburg, was removed in 2004. The river is now completely open and free flowing from its source to its mouth. The EA for the Embrey Dam removal (U.S. ACOE 2002) shows that the sediments behind the dam had levels of targeted metals and organics generally below detection limits (Lingenfelter, pers.comm. 2005).

The Rappahannock River has the lowest percentage of wetlands and shoreline with a riparian buffer of all the Virginia river tributaries of the Chesapeake Bay. Perhaps related is the fact it has the second-highest total area and percentage of

Influences on Water Quality

agricultural land at 31.4 percent (Dauer et al. 2005). However, it has the lowest population density and the smallest area and percentage of developed land. In addition, it also has the smallest percentage of area with an impervious surface of all the Virginia tributaries. Finally, compared to other eastern Virginia rivers, the Rappahannock River has only one EPA Superfund site that is outside the refuge boundary in Montross, and few other point sources of contamination or historical chemical or oil spills.

Chemical Pollution

The Arrowhead Associates, Inc./Scovill Corporation site is the only Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, or Superfund) site in the project area. The EPA manages the Superfund program, which cleans up hazardous waste sites to protect human health and the environment. The Arrowhead site occupies 25 acres in Montross, a rural area of Westmoreland County, Virginia. The activities of a former electroplating facility led to the contamination of soils and groundwater with metals and volatile organics. The EPA listed the site as a National Priority in 1990. Since then, the entire physical cleanup has been completed. No cleanup sites are listed in our project area, according to the Resource Conservation and Recovery Act database administered by the EPA.

Although the history of the project area shows a low number of chemical or oil spills, current threats of contamination remain. A high percentage of land in the area is in agricultural use, which historically may have provided a source of bioaccumulative pesticides to the land and the river. Those pesticides no longer are registered for use. Most pesticides in use today have shorter half-lives and target specific species, compared to the organochlorines and organophosphates previously in use.

Sediments

The erosion of upland land surfaces and stream corridors (banks and channels) are the two most important sources of sediment coming from the watershed. Although that is a natural process, it may have increased significantly over the past few centuries because of human impact. These are two general observations on the mass and rate of sediment accumulation in the project area.

- For the entire Chesapeake Bay region, river basins with the highest percentage of agricultural land use have the highest annual sediment yields, and basins with the highest percentage of forest cover have the lowest annual sediment yields.
- Urbanization and development can more than double the natural background sediment yield; the increase in sediment yield is highest in the early development stages (Langdon and Cronin 2003).

During the 18th and 19th centuries, nearly 70 percent or 80 percent of the original forest cover was cleared, which increased erosion rates in the watershed. Although reforestation followed 20th-century farm abandonment, high erosion rates continue. That may be attributable to development and the remobilization of deposits of previously eroded material.

Furthermore, much of the sediment eroded from cleared land during Colonial times may still be stored in upland areas, in stream corridors, channels and tributaries. What proportion of that “legacy” sediment actually has reached the bay is unknown, but ultimately it will make its way to the bay. Such quantities of stored sediment mean that future improvements in water clarity may take years to decades after implementing changes in land-use in the watershed (Langdon and Cronin 2003). A USGS report in 2003 describes the relative concentrations of total

suspended solids during the winter and spring of 1992–1993 in the Chesapeake Bay and its tributaries (USGS 2003). Sediment loads were in the 105–150 mg/liter range in the project area.

Long-Term Trends and Status of Water Quality for the Rappahannock River (1985–2004)

In 2005, the VA DEQ released a water quality summary on the Chesapeake Bay and tributaries (Dauer et al. 2005). It describes the long-term trends and status of water quality and living resource conditions since 1985, with recent updates in 2003 (www.chesapeakebay.odu.edu; “Reports”). The DEQ Quality Assurance Project Plan describes its field sampling procedures for water quality (<http://www.chesapeakebay.net/qatidal.htm>). The abiotic measures for water quality include total suspended solids, nitrogen and phosphorus load, chlorophyll a, temperature, salinity, and dissolved oxygen. The biotic parameters of quality include

- the phytoplankton community (floating organisms that can use photosynthesis for energy);
- the benthic community (organisms that dwell or feed on the bottom—the benthic index of biotic integrity is used to measure overall quality and identification of impaired waters);
- abundance/biomass ratios as a measure of pollution due to organic enrichment; and
- submerged aquatic vegetation (SAV).

Sampling stations placed at the Fall Line in Fredericksburg and below in the tidal fresh, transitional, and brackish zones started at about Payne’s Island and extended to the river’s mouth. The tidal fresh and transitional zones are most relevant for our project area.

Approximately 291,000 metric tons per year of the non-point source runoff of nitrogen and phosphorus combined enter the Rappahannock River. The application of best management practices resulted in a 23-percent reduction in sediments from 1985 to 2005. However, the point source runoff of nitrogen is higher below the Fall Line. The point source runoff of phosphorus typically had been higher above the Fall Line until 1995, when it fell back to levels comparable to those of phosphorus below the Fall Line.

Annual mean flow was higher than the grand mean during the last 2 years. Improving trends in flow adjusted concentrations of total nitrogen and total phosphorus above the Fall Line. The relative status of nutrients was good in nearly all segments of the river (including the refuge boundary area); while in others, it was fair. In the tidal fresh and transitional zones, the trends in the relative status of most non-nutrient parameters (chlorophyll a, suspended solids, temperature, salinity) were fair, poor, or unchanged, except bottom dissolved oxygen, which was good.

Although most SAV habitat requirements for nutrients were met in all applicable segments, degrading long-term trends in surface total nitrogen were detected in the transitional zone, and the water clarity requirements for chlorophyll a, total suspended solids, and secchi depth¹ either were not met or were borderline in the tidal fresh and transitional zones.

Although the status of phytoplankton (diatom, chlorophyte, cryptophyte) biomass was good and the ratio of biomass to abundance was poor throughout the river, an

¹ an instrument that measures the depth of clarity of the water column

improvement is detected moving downstream from the transitional to the lower river. Degrading trends in cyanophyte biomass and abundance were detected throughout the river.

The benthic community met restoration goals only at the transitional zone station, and became more degraded moving downstream. An analysis of probability-based monitoring of benthic samples showed impairment of the tidal fresh zone (7 percent of the samples) and brackish zone (37 percent of the samples). Benthic degradation appears to be the result of contamination from human sources in the tidal fresh zone, but may be the result of contamination and low dissolved oxygen (DO) in the lower river. An insufficient abundance/biomass of benthos is indicative of low dissolved oxygen (DO).

Based on the results of the two Old Dominion University-DEQ reports (2004 and 2005), the Rappahannock River has lower sediment, total phosphorus and total nitrogen loads than the James River. The Rappahannock River has lower total nitrogen loads than the York River, but higher sediment and total phosphorus. (The Rappahannock is lower in point-source phosphorus loading, but higher in non-point source.) The total point and non-point source nitrogen and sediment loads were less in 2004 than 2001 showing a good trend. The total load of non-point source phosphorus also was lower in 2004 than 2001, but the point-source phosphorus load went up.

Overall, the combined phosphorus load in 2004 is lower than in 2003 (and the data in the 2003 report was already on a downward trend compared to the 1985 baseline loads—also good). The 2003 report states that the primary concern is water clarity (relating to chlorophyll a) in the upper two study segments of the Rappahannock. The 2005 report also shows that the upper segments are more degraded, but low dissolved oxygen is becoming a problem at 33 sites, leading to insufficient benthic communities in those areas (a downward trend). The 2003 report also reveals that dissolved oxygen is improving, and that dissolved oxygen (DO) conditions were good in most river segments. The report suggests that the sediment contamination may be more extensive than previously thought, although it is not relative to contaminants (perhaps just sediment loads).

The 2005 report suggests that water quality problems appear to be more severe in the tidal fresh segment of the river, and include poor status and violations of SAV habitat criteria for both suspended solids and secchi depth, with increasing trends in either the total or dissolved concentrations of nitrogen. The increased biomass and abundance of cyanobacteria are negatively affecting the phytoplankton community. With respect to living resources, and with all parameters combined, probability-based monitoring resulted in a classification of unimpaired for the upper river (tidal fresh zone) and impaired for the lower river (brackish zone).

State-reported Impaired Waters in the Lower Rappahannock River²

In August 2004, the DEQ released the 305(b)/303(d) Water Quality Assessment Integrated Reports (report). It combines both the 305(b) Water Quality Assessment and the 303(d) Report on Impaired Waters for each river basin. The DEQ, with the assistance of the DCR, compiled those reports and submitted them to the EPA and Congress, to satisfy the Federal reporting requirements under section 305(b) of the Clean Water Act.

Much of the data in those reports comes from citizen-generated water quality monitoring at designated sites. The Alliance for the Chesapeake Bay (ACB) coordinates with several affiliate organizations in the Rappahannock River Basin to monitor a conventional suite of ambient parameters including dissolved oxygen, temperature, pH, salinity and water clarity. Affiliate organizations in the

² from VA DEQ Report Impaired Waters (2004)

basin include the Cat Point Creek Group, Friends of the Rappahannock, and the Tidewater Resource Conservation and Development Council. Trained volunteers conducted 1,263 samplings at 13 stations in the Rappahannock River Basin during the 5-year data window of the report for this basin (VA DEQ 2004). The monitoring stations that have been used over the past decade (not all are currently active) are at Kendale Farm Dock, Daingerfield Landing, Piscataway Creek, Wares Wharf, Port Royal, Hoskins Creek, Cat Point Creek (four stations), Little Totuskey Creek, and Totuskey Creek (four stations).

The report on impaired waters in the state describes segments of streams, lakes, and estuaries that exhibit violations of water quality standards, details the pollutant responsible for the violation(s) and the cause and source of the pollutant, if known. Most impairments of water quality in the Rappahannock River watershed come from fecal coliform, which could be related to agriculture and livestock practices, wildlife sources (e.g., deer or geese), or residential sources (e.g., failing septic tanks, dogs or other pets) (Lingenfelter 2005; personal communication). On one stream segment close to the mouth of the river, the recorded dissolved oxygen (DO) was also a concern. That possibly is caused by a naturally occurring ridge in the riverbed that prevents tidal flushing of the lower water column in this segment of the river. The low DO bottom water causing the DO violations is believed to be bottom water from the Chesapeake Bay. That bottom water flows into the river with the incoming tide, and then is trapped by the ridge. Thus, natural conditions are considered the main source of the recorded violations. However, it is possible that nutrient loadings in the water body exacerbate the low DO condition. The DEQ report is available from refuge headquarters upon request.

Submerged Aquatic Vegetation as an indicator of water quality

Submerged Aquatic Vegetation (SAV) is a critically important component of the aquatic environment in the Chesapeake Bay, and its presence and robustness are indicators of good water quality. SAV can only thrive in shallow depths where light reaches the benthic zone. The rooted aquatic beds provide shelter and food for numerous aquatic invertebrates, and protective cover for blue crabs during their

An accessible trail on the Hutchinson Tract



USEFWS

molt. SAV also recycles nutrients and oxygenates the water. A great number of waterfowl and aquatic mammals (e.g., muskrats) feed on SAV. SAV beds on the Rappahannock River are a primary reason the area is an attractive wintering area for waterfowl (White 1989).

SAV composition varies with salinity. In the moderately brackish zones of bay tributaries (such as the middle Rappahannock River), redhead pondweed (*Potamogeton perfoliatus*) supports a mix of estuarine and marine invertebrates. In the fresher portions of the river, wild celery (*Vallisneria americana*) should flourish. Other common species in fresh to moderately brackish waters include common waterweed (*Elodea canadensis*), coontail (*Cerataophyllum demersum*), water milfoil (*Myriophyllum spicatum*), sago pondweed (*Potamogeton pectinatus*), horned pondweed (*Zannichellia palustris*), widgeon grass (*Ruppia maritima*), and eelgrass (*Zostera marina*).

In the last few decades, the bay has experienced declines in SAV coverage due to turbidity, siltation, and nitrification, which all block sunlight. Other causes include the installation of piers, docks, and marinas that block light, or from props, which tear up vegetation. SAV provides the important function of stabilizing shores by diffusing wave action. Yet today, the development on the shoreline of the Northern Neck and Middle Peninsula produces more and more revetments and retaining walls instead of natural shoreline. Since 1971, the Virginia Institute of Marine Science has surveyed SAV in the Chesapeake Bay and its tributaries annually (VIMS 2005). However, SAV flight transects generally do not cover the upper Rappahannock River due to limited SAV beds (Forsell 2005, personal communication).

The 2005 VIMS SAV flight survey on the lower Rappahannock River noted small beds along the north shore at Windmill Point, Mosquito Islands, at the mouth of Carters Creek, along the shoreline from Carters Creek to the mouth of the Corrotoman River, and along both shorelines of the Corrotoman. Most of the beds in this system are dominated by widgeon grass, with eelgrass found primarily at the mouth of the river in the bed off Windmill Point. No significant changes appeared in the beds in this system, although some of the widgeon grass beds appeared a little larger and denser than in 2004. Eelgrass planted between 1996 and 2001 off Sanders Cove just above the Route 3 bridge all died out in 2003. There were no beds noted along the south shore, similar to previous years (Orth 1995).

Small patches of widgeon grass or eelgrass were noted further upriver in Occupacia Creek, Mount Landing Creek, Brockenbrough Creek, and Sluice Creek between 2002 and 2004 (S. Spencer personal observation). Brockenbrough Creek, one site of the Federal-listed endangered sensitive joint-vetch (*Aeschynomene virginica*), also had thick beds of hydrilla, an invasive aquatic plant, in 2005 (Spencer personal observation).

The Regional Socio-Economic Setting

Socio-economic Factors: Regional Economic Setting

We enlisted the U.S. Geological Survey (USGS), Fort Collins Science Center, Policy Analysis and Science Assistance Team in developing a regional socioeconomic profile. We included their report as appendix I in the draft CCP/EA. We recommend it for a good overview of the regional economic setting and the relationship between it and the refuge.

Refuge Administration

Refuge Establishment and Land Acquisition

In May 1996, we acquired the first 1,100 acres for the refuge. Our acquisition of land has been relatively steady since then: a total of 7,711 acres composed of 6,352 acres we own in fee simple and 1,359 acres of conservation easements as of September 30, 2007. Our Director's decision in 1995 approving the refuge boundary allows us to acquire up to 20,000 acres within a boundary of more than 260,000 acres. The original EA establishing the refuge identifies four resource concentration complexes (A, B, C, and D) and delineates individual focus areas within these concentration complexes based on their important habitat and wildlife values in need of protection. We are to protect those 20,000 acres through a combination of fee title purchase and easement acquisition of development rights, with monies authorized primarily under the Land and Water Conservation Act and the Migratory Bird Conservation Act. We base all of our land acquisition on our policy of working only with willing sellers. Originally, we anticipated protecting at least 50 percent of that land, or 10,000 acres, by acquiring conservation easements.

The Eastern Virginia Rivers NWR Complex and Staffing

When the refuge was established, we administered it as a satellite of the Presquile and James River refuges from their headquarters in Prince George, Virginia. In 1999, we assigned its first three staff members: a wildlife biologist, a biological technician, and an assistant refuge manager.

In 2000, the refuge manager at the Presquile refuge transferred elsewhere. Our regional NWRS supervisors decided to shift the focus of existing staff resources to the Rappahannock River Valley refuge, where the development and growth of land acquisition and public use programs required more attention. The new refuge manager reported to the new refuge headquarters in Warsaw, Virginia, in June 2000. When the administrative assistant at the Presquile refuge retired in 2001, we also moved that position to the new headquarters office in Warsaw, and added a maintenance worker and a law enforcement officer in 2004. A transfer in 2001 vacated the biological technician position, which remains vacant. We have hosted a Student Career Experience Program (SCEP) position at the refuge since 2001.

We use the term "refuge complex" to describe two or more individual refuges, typically in the same region of a state or adjoining states, administratively combined under a single refuge manager's responsibility. When we redirected staff and other resources in 2000, the management responsibility for the Presquile and James River refuges remained with the refuge manager stationed at the Rappahannock River Valley refuge. At that time we established the Eastern Virginia Rivers National Wildlife Refuge Complex. In 2003, we added the management responsibility for a fourth refuge, the Plum Tree Island refuge in Poquoson, Virginia, to the refuge complex.

Present staffing at the Refuge Complex includes seven positions: six in Warsaw at the Rappahannock River Valley refuge headquarters, and one in Charles City, VA. As part of our "2006 Regional NWRS Strategic Workforce Plan," the position at the Charles City sub-office primarily will support visitor services at the James River, Plum Tree Island, and Presquile refuges. Nevertheless, all positions in the refuge complex share the responsibility of managing all four refuges. The refuge manager is responsible for determining how to distribute staff time to accomplish priority work.

Funding

The funding for the Rappahannock River Valley refuge is embedded in the budget for the entire refuge complex. Operational funding includes salaries, supplies, utilities, fuel, and all other operational activities (wildlife and habitat surveys and management) that are not funded by special projects. Base maintenance funds are used to repair vehicles, equipment, and facilities generally have been stable over the past 5 years. The replacement of vehicles, larger pieces of equipment (e.g., tractor, backhoe), or larger facilities (buildings) are funded as projects. Our annual funding fluctuates according to the number and size of special

projects funded that year (e.g., vehicle or equipment replacement, visitor service enhancements, and facility improvements). Appendix I in the draft CCP/EA summarized refuge funding levels, using fiscal year 2006 as the base year, in the section “Economic Contribution from Alternative A (Current Management), Refuge Administration”.

Refuge Facilities and Maintenance

The facilities now in use include the refuge headquarters (the Wilna house, circa 1830, eligible for the National Register of Historic Places), six barns and sheds, one maintenance shop, one public rest room, one multi-purpose building and two houses (refuge residences, of which one is also considered historically significant). Additional facilities not in use, and in disrepair, include approximately 20 barns and sheds, 9 grain bins, and 1 house. Although the Service owns them, we acquired them with land purchases; they are not crucial in accomplishing the purposes of the refuge or the mission of the Service.

We removed 11 dilapidated barns, sheds, or houses from the Tayloe, Wellford, and Hutchinson tracts in 2006. Two of those were replaced: the Hutchinson house was replaced with a multipurpose building located on the Wilna tract; and, the Tayloe house was replaced with a refuge residence located on the same tract. A third house on the Laurel Grove tract is being rehabilitated for eventual use as staff residence or administrative building. The maintenance staff of the refuge complex is responsible for preventive maintenance and repairs on all facilities.

The refuge also has a fishing pier, dock, boardwalk, accessible trails, six interpretive signs, four water control structures, nine gates, and numerous informational signs (such as boundary, entrance, and directional signs). In 2007, we installed a 150-foot radio tower to facilitate refuge communications. Our maintenance staff is responsible for the upkeep of these facilities, including clearing trails, replacing or posting boundary signs, and repairing or replacing other interpretive signs. We gratefully accept volunteer assistance for maintenance as well.

The refuge owns one small mobile trailer and one large office trailer. Through a memorandum of agreement, the VDGIF uses and maintains the office trailer on the Wellford tract. Operating as their sub-office, this facility serves the area wildlife biologist and conservation police. The small mobile trailer, which has a permanent hook-up on the Wilna tract, temporarily houses interns or researchers.

The refuge owns and maintains 13.75 miles of dirt, gravel, and paved roads on 10 different tracts (9.4 miles are open to the public). The refuge maintenance staff is responsible for clearing and mowing the roadsides, repairing 14 culverts, and graveling and grading the roads. The Federal Highway Administration is rehabilitating 9.4 miles of refuge roads on the Wilna, Tayloe, and Hutchinson tracts.

Refuge step-down plans

Seven step-down plans are now in place at the refuge:

- Fire Management—2002; is planned to be updated in 2009
- Public Deer Hunting—2002
- Public Fishing—2003
- Environmental Education—2004
- Avian Influenza—2007
- Hurricane Action Plan—2008 (updated annually)
- Chronic Wasting Disease Plan—2008

Findings of Appropriateness and Compatibility Determinations

Chapter 1 describes these two decision processes in detail. The list below includes compatibility determinations (CDs) that are currently approved for the refuge and the dates of their approval. All of the CDs can be reviewed in Appendix B. See also the discussion below on special use permits.

- Cooperative Farming—12/08/06
- Public Deer Hunting—01/28/02
- Recreational Fishing—01/24/03; reviewed and proposed revision in CCP (re: appendix B)
- Environmental Education, Interpretation, Photography, and Wildlife Observation—03/26/03; reviewed and proposed revision in CCP (re: appendix B)
- Research—03/23/07

Partnerships

During its first 12 years, the refuge has combined its resources with others to form a wide array of outstanding partnerships. Some partners have joined us to complete a single project or compete for a grant, while others became engaged prior to refuge establishment and continue today. Naming all of those we have worked with over the past 12 years to advance common conservation objectives would be difficult. However, we recognize at least some of them below for their longevity and significant contributions.

Land Protection Partners

Our most enduring partnership involves several regional, state, and national organizations who have worked with the refuge to protect nearly 8,000 acres of fish and wildlife habitat. They include the Chesapeake Bay Foundation, The Conservation Fund, The Nature Conservancy, Trust for Public Land, and the Virginia Outdoors Foundation. They have generated grants, served as interim owners of land that is now part of the refuge, sought acquisition funding from Congress, and acted as liaisons with the community. Our newest land protection partner is Fort A.P. Hill. We are working together to protect valuable wildlife habitat and an undeveloped buffer of land between the refuge and military training activities.

Rappahannock *Phragmites* Action Committee

This ad hoc committee of Federal, state, and county agencies, conservation organizations, and landowners formed in 1999 is dedicated to halting the spread of invasive populations of *Phragmites* in the lower Rappahannock River watershed. In recent years, the refuge and refuge volunteer Alice Wellford have assumed lead roles in the annual control program. To date, we have treated several hundred acres of *Phragmites*, mostly on private land, using grants, Service funds, and contributed funds.

State Agencies and Universities

We have strong ties to state agencies in achieving mutual conservation objectives. We cooperate closely with the VGDIF in population and habitat management programs and law enforcement, especially in the areas of public fishing and deer hunting. The State Conservation Police and the regional biologist occupy an office trailer on refuge land through a memorandum of agreement, allowing close collaboration with refuge staff. We also collaborate with the department's Wildlife Diversity division on non-game wildlife conservation, including bald eagle surveys, protecting habitat, and conserving other migratory birds, reptiles, and amphibians.

We have a cooperative agreement with the Virginia Department of Conservation and Recreation (DCR), through which we received an initial survey of natural heritage resources on the refuge. We renewed the agreement in 2006 to include a



USFWS
Chesapeake Bay Program Agricultural Day

project to map *Phragmites* in the entire tidal portion of the river. We continue to collaborate on conserving rare animal and plant communities, burning prescribed fires, and controlling *Phragmites*.

We have also worked closely with four state universities: The Center for Conservation Biology at the College of William and Mary, the Conservation Management Institute at Virginia Polytechnic and State University, and the biology departments at Virginia Commonwealth University and the University of Mary Washington. The topics of collaboration include surveying and conserving bald eagles, conserving other migratory birds, mapping vegetation and habitat, conserving reptiles, and researching Lyme disease.

Rappahannock Wildlife Refuge Friends Group

The Rappahannock Wildlife Refuge Friends (Friends) group formed in August 2004. Its mission is to “support the National Wildlife Refuge System and promote awareness of the refuge through education and support.” In March 2006, its membership included 53 individuals or families, including a six-member board. The board, one or two refuge staff, and several members attend its monthly coordination meetings. Presentations by quarterly guest speakers are open to the public. The Friends completed several projects in their first year, including the installation of informational signs at Wilna Pond and the Hutchinson tract. They staffed several community events, and were instrumental in gaining the refuge acceptance into the Chesapeake Gateways Network in March 2006. The Friends group continually grows in membership, stature, and effectiveness.

Volunteer Program

The refuge Volunteer Program consists of members of the Friends group, other groups, and individuals, including Boy Scout troops, Eagle Scouts, St. Margaret’s School, the Governor’s School, Northern Neck Audubon Society, Virginia Herpetological Society, Virginia Native Plant Society, interns, students, and retirees. Whether community-service-oriented, career-oriented, or just because they wanted to get involved with the refuge, volunteers have donated valuable time and energy toward accomplishing many worthy projects. Thus far, volunteers have offered their assistance in coordinating and staffing special events, writing public use facility grants, following up the coordination and construction of facilities, installing and monitoring nest boxes, and conducting refuge and volunteer outreach, botanical and wildlife surveys, invasive species control, and numerous

maintenance projects. Since the Friends group formed in August 2004, volunteer hours dramatically increased (see table 3.1 below).

Table 3.1. Refuge volunteer hours, 2004–2008

Project Description	2004	2005	2006	2007	2008
Habitat and Wildlife	153	191	272	386	416
Maintenance	23	345	11	247	29
Wildlife-oriented Recreation	203	219	659	157	1,008
Cultural Resources	8	0	0	0	0
Environmental Education	0	4	0	24	8
Other		249	168	366	327
Hours Total	390	1,007	1,110	1,180	1,787

Community Outreach

Relating to the communities in the refuge area is very important to us. We provide numerous on-site and off-site programs throughout the year. Community events at which our staff or volunteers have staffed displays, performed outreach, or presented programs include Rivahfest, Warsawfest, and Welcome Home to Westmoreland County (county fairs); Down on the Farm Tour; and Forestry/Wildlife Management Tour (habitat management guidance for private landowners); schools, and other local interest group meetings (e.g., Virginia Ornithological Society, Garden Clubs, Virginia Native Plant Society, Northern Neck Audubon Society, Northern Neck Land Conservancy, Rotary Club, Lions Club, etc.).

On-site activities include guided bird walks and interpretive tours. In addition, the refuge hosts popular events such as Kid's Fishing Day and, in 2007, offered the first community workshop on invasive species.

We conduct outreach through the media. Newspaper articles inform the public about upcoming special events, CCP meetings, habitat management activities, and other current issues at the refuge. We maintain an informative website, and contribute to Friends Group publications.

In the spring and summer of 2006, we enlisted the USGS, Ft. Collins Science Center, Policy Analysis and Science Assistance Branch to help us conduct a survey of community residents adjacent to the refuge. We felt the results of a survey would help our planning team collect baseline information to use as we identify issues, characterize current visitor services and experiences, develop management options, and improve our outreach program. Specifically the purposes of the survey were to

- gain a broader understanding of community recreation use of the Rappahannock River;
- determine community preferences for wildlife-dependent recreation activities and services that could potentially be provided by the refuge in the future,
- determine community knowledge and understanding of the refuge purpose, the mission of the NWRS, and land acquisition issues,
- provide insight into community communication and interaction regarding river issues, and
- determine community preferences for land management on the refuge.

We sent the survey to a randomly selected group of 1,200 residents in a defined study area; the response rate was 35 percent. Appendix G in the draft CCP/EA was an executive summary of the results of the survey.

Special Use Permits, including Research

Special use permits are issued to individuals, organizations, and agencies that request the use of refuge facilities or resources beyond what is available to the public. Current Service policy requires an evaluation of appropriateness and compatibility before issuing special use permits. Furthermore, in order to ensure that wildlife disturbance is minimized, special conditions and restrictions are identified for each permit awarded. On average, we issue five permits each year on the refuge, with specified periods ranging from one day to one year, depending on the nature of the request. We evaluate each request individually. Table 3.2 identifies some of the permits we have issued since 2002. You may obtain additional details from the refuge headquarters.

Table 3.2. Sample of special use permits approved since 2002

Year Issued	Permittee	Purpose
2002	Virginia Commonwealth University	To collect macro-invertebrate and fish samples as part of a water bio-monitoring project.
2002	Northern Neck Soil and Water District	To collect acorns to use in reforestation project.
2003, 2004 & 2005	Chesapeake Bay Foundation	To conduct wetland and reforestation projects, and to conduct monitoring.
2003	Natural Resources Conservation Service	To conduct plant identification course.
2003	York University	To conduct research on the conservation genetics of Acadian flycatchers.
2004	Verizon	To install underground telephone cable.
2004 & 2005	Boy Scout Troop	To conduct ceremonial "Crossing Over" per formal agreement with the Boy Scouts of America.
2004	Virginia Society of Ornithology	To conduct annual foray (bird survey).
2004	W.B. Boyle Farms	To allow access through the refuge during periods when primary access is hazardous.
2004	St. Margaret's School	To conduct early succession grassland and forest vegetation survey.
2005	Virginia Herpetological Society	To conduct reptile and amphibian survey.
2005	Virginia Commonwealth University	To conduct snake lesion study (July – September).
2005	Virginia Department of Game and Inland Fisheries	To band mourning doves as part of a state-wide study.
2006	Virginia Department of Game and Inland Fisheries	To harvest white tailed deer for use in training course for Game Wardens.
2006	Deer hunting dog owners	To permit retrieval of trespass dogs during the deer hunt season.
2007	Northern Neck Electric	To install underground electric service to Wilna Lodge
2007	Individual	To remove excess buildings for reuse
2007	Center for Conservation Biology	To conduct research on the relationships between pine forest management and breeding birds
2008	Virginia Department of Game and Inland Fisheries	To conduct research on movements of black ducks via satellite telemetry
2008	Individual	To use a trailer to launch a non-motorized boat for fishing access at Wilna Pond

We support research activities on the refuge, when they are compatible with the refuge purposes, and help us gain knowledge and understanding to benefit our management goals and objectives. Refuge staff, graduate students, conservation organizations, and others have conducted numerous research projects on the refuge. A sampling of those follows. You may obtain additional information on these studies from the refuge headquarters.

**Region 5 Grassland
Breeding Bird Pilot Study,
2001–2004**

Thirteen refuges with grassland management units in Region 5 participated in this three-year study, which examined the response of obligate grassland birds to three different management treatments (no treatment, mow, or burn) of fields in fallow cool season and planted warm season grasses, and with respect to vegetation height-density, percent grass-forb frequency, and species composition. We enrolled seven fields in this study. Although height-density and percent grass were important in determining obligate grassland bird presence and density, landscape context was the single most important factor in determining presence of obligate grassland birds.

Fields situated in landscapes of high agricultural use were more likely to attract grassland birds than those in predominately forested landscapes, regardless of the quality of the field. In 2004, we conducted a follow up study, which examined more closely obligate grassland bird use of fallow vs. warm season grass fields and again measured vegetation height-density, percent grass-forb frequency and species composition. Obligate grassland bird density or abundance was negatively correlated with vegetation height density, and particularly negatively affected in fields of dense switch grass.

**Winter Grassland Bird Pilot
Study, 2003–2005**

The use of the refuge in the winter or non-breeding seasons by land birds is understudied, particularly that of grassland species. This pilot study sought to find a robust yet affordable methodology for surveying grassland birds so that more refuges could contribute data.

In the first year, single vs. double observers, the use of long poles to flush birds out of dense cover, and the most effective transect layout were examined.

- The double observer method was found to be significantly more reliable than single observer method;
- Two observers walking side by side along a transect was found to be equally as effective for flushing birds as was using thrashers; and,
- Full field coverage of transects about 100 meters apart was found to be the most effective for detecting birds compared to a few randomly scattered transects.

In the second year, the number of survey bouts, the number of run days per survey bout, and the time of winter were examined for the most effective yet minimal effort. Based on preliminary analysis, only one bout of 4 to 5 days in January was sufficient for obtaining an adequate sample size of data for this latitude and this region. That also was conducted at the Prime Hook refuge.

In 2005, the third and final year of the pilot study, the difference in detection probability of expert surveyors and non-experts was compared at Rappahannock to determine whether winter grassland studies could be conducted by amateurs with reasonable quality and accuracy of data. Non-experts had significantly

Effects of Salinity on the Distribution of *Phragmites australis* along the Rappahannock River Valley National Wildlife Refuge, 2004–2005

higher recordings of “unknown sparrow species” for bird identification, yet were comparable to experts with respect to overall abundance detections. The refuge continues to employ these modified techniques to survey winter grassland birds.

Phragmites is a plant species that grows in wetlands worldwide. In North American wetlands, both native and non-native sub-species have been identified. The non-native sub-species M is rapidly expanding and displacing native marsh vegetation, including the native *Phragmites* sub-species. Along the Rappahannock River, native and non-native populations appear to be spatially isolated along a salinity gradient.

This experiment studied the effects of salinity on the growth of native sub-species F individuals grown in a greenhouse in varying salt solutions. Those plants exhibited a significant decrease in growth between 0 practical salinity units (psu) and 5 psu; however, the non-native sub-species did not show a significant decrease in growth until 20 psu. This study also determined the effects of salinity on the establishment of native and non-native sub-species in wetlands along the Rappahannock River through a GPS mapping project. Native populations were found only in environments with salinity levels of 0 psu, while non-native populations were established in wetlands with salinity ranging from 0 to 10 psu. These results are useful in identifying wetlands of primary concern for controlling non-native expansion and protecting native populations.

Snake Lesion and Amphibian Investigation 2005–ongoing

In June 2005, the Virginia Herpetological Society held their annual spring meeting in the project area, and used the refuge for their field trips to search for herpetofauna. On that weekend, a number of captured snakes had skin lesions and eye infections; this occurred across species. The principal investigator, a pathologist from Virginia Commonwealth University (VCU), organized a team to conduct periodic histological samplings from the snake population at the refuge over the next couple of years to determine the scope and cause of that problem. The unusually cool and wet spring of 2005 was offered as a possible explanation, partially substantiated by the fact that subsequent collection in drier parts of the year did not produce any further cases of snakes with lesions. There is little data on diseases of snakes in the wild (most is on captive or pet snakes). The study effort continues into 2009 and expanded to include the James River and Presquile refuges.

Refuge Natural Resources

Physical and Vegetation Resources

Soils—General description

In 2006, newly digitized county soil databases from NRCS and GIS software (ArcMap, ArcView 9.1) made it possible for us to summarize the different soil types within the project area and within refuge tracts. The digitized soil maps per county were clipped to the refuge boundary and then ranked in descending order by acreage. A copy of this soils information for the refuge is available upon request from refuge headquarters. The most prevalent four soil types on the refuge, composing well over 50 percent of its area, include Rappahannock muck, Rumford soils, Tomotely fine sandy loam, and Nansemond fine sandy loam. A summary of their characteristics appears in table 3.3, below. You may obtain additional information from the refuge headquarters.

Table 3.3. Summary and characteristics of the four most prevalent soil types on refuge-owned tracts

Soil Type	Local Landform	Hydric, Traits	Suitability
Rappahannock Muck	Tidal flats, Floodplains, Depressions	Floods, and ponds	Agriculture: No Silviculture: No
Rumford 15-50% slopes	Depressions and Seeps	May saturate or pond if Bibb or Levy components present	Agriculture: No Silviculture: Well to moderately suited
Tomotely fine sandy loam	Marine terraces	Saturates	Agriculture: Prime Silviculture: Well suited
Nansemond fine sandy	Marine terraces Depressions	Saturates	Agriculture: Prime if drained Silviculture: Well suited

Refuge Vegetation

Habitat Type Descriptions

We define habitat types for the refuge based on two vegetation-mapping projects we conducted in support of the CCP. We enlisted the expertise of the VA Tech GIS/Remote Sensing Project office to complete the photo interpretation and digital mapping. Aerial photography from 2002 was used as the base year for this interpretation.

All refuge tracts were mapped according to the National Vegetation Classification System (NVCS), which is the Federal standard. That system is based on a relatively fixed hierarchy of floristic units, including associations and alliances, which are the recommended level to apply to refuge mapping projects. An association is the most basic floristic vegetation classification unit within the NVCS. It is a plant community of definite floristic composition, a defined range of species composition, diagnostic species, uniform habitat conditions and physiognomy. An alliance is a group of associations which share floristic characteristics, but is more compositionally and structurally variable, more geographically widespread, and occupies a broader set of habitat conditions (ESA 2004). Additional information on the NVCS and mapping standards is available at www.esa.org.

We also mapped vegetation within the entire project area using the “ecological systems” classification system developed by NatureServe. An ecological system is a group of plant community types (associations) that tend to co-occur within landscapes with similar ecological processes, substrates, and/or environmental gradients. A given ecological system typically will manifest itself in a landscape at intermediate geographic scales of tens to thousands of hectares and will persist for 50 or more years” (Comer et al. 2003). These units form a cohesive, distinguishable unit on the ground. Map 3.1, below, depicts ecological systems for the project area.

In deriving our habitat types for this CCP, we considered the detailed vegetation information we now have on hand from the VA Tech project, the scale on which we wanted to present our management of refuge lands, our capabilities to map and monitor vegetation changes in the future, and the ability to do landscape-level analyses. None of these considerations precludes detailed mapping, monitoring and inventories of vegetation in the future, if we determine a need.

Table 3.4, below, represents how we chose to delineate refuge habitat types.

Map 3.1. Ecological Systems on or near the Rappahannock River Valley National Wildlife Refuge

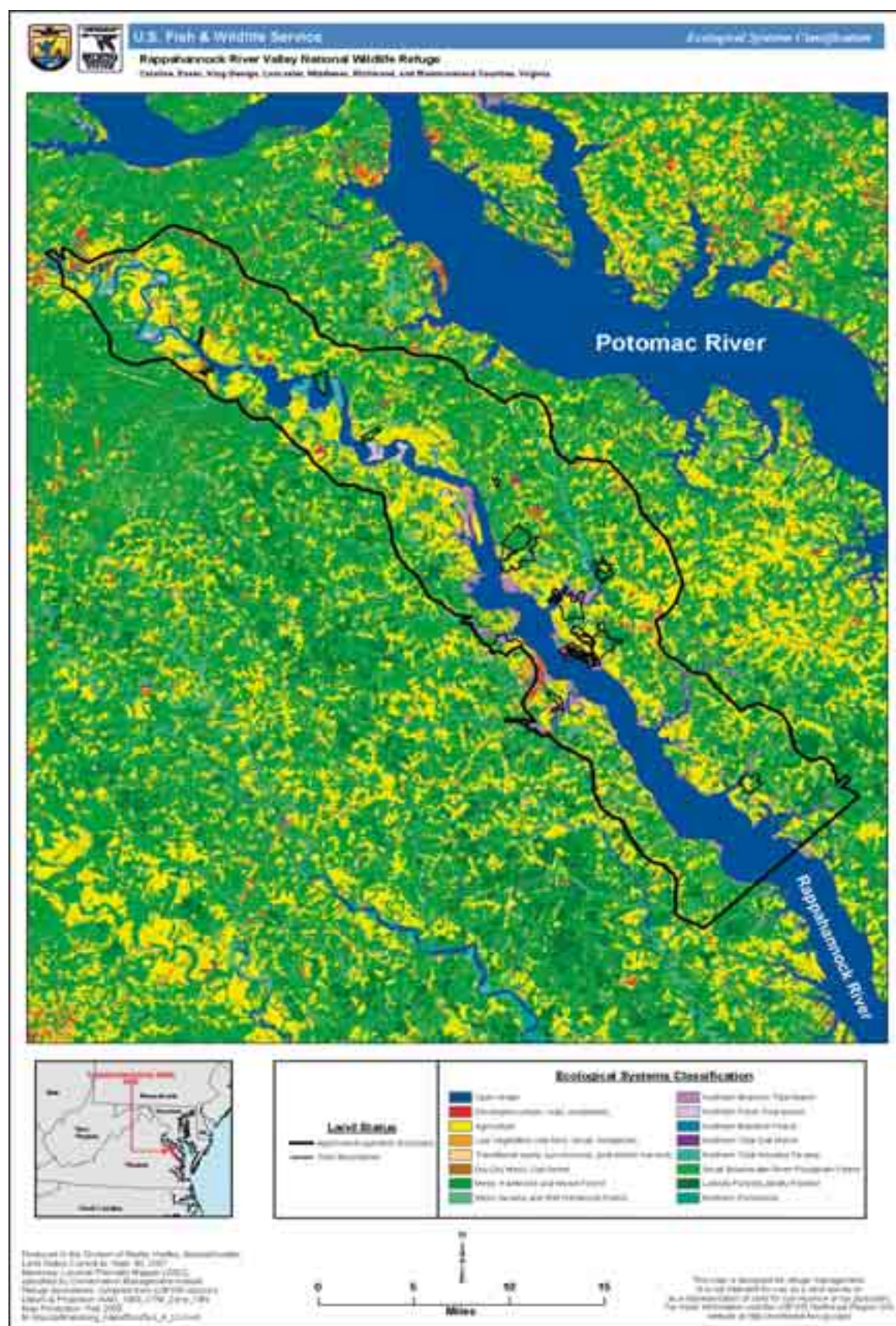


Table 3.4. Present number of acres of each refuge habitat type

Refuge Habitat Types	Refuge Acres
Agricultural	738
Basin Swamp and Wet Hardwood Forest	453
Beach	3
Coastal Plain Pond shore/Wet Meadow	57
Developed	55
Early Successional/Shrub/Old Field	1558
Hardwood-Mixed Forest	1563
Loblolly Forest	1771
Northern Brackish Tidal Marsh	936
Northern Fresh Tidal Marsh	259
Northern Tidal Wooded Swamp	76
Open Water	242
Total	7,711 acres*

**Note. This table approximates total acres and acres by habitat type, based on summing up habitat polygons delineated from 2002 aerial photo interpretation. The sum of these habitat type delineations is not exactly the same as the sum of our land tract surveys conducted in the field; the latter is our official source for acres. Nevertheless, the difference is less than 10 acres. The totals in this table include both easement and fee title properties, as of September 30, 2007.*

Maps 3.2–3.9, below, show the different habitat types of each refuge tract acquired as of September 30, 2007, including easement tracts. As noted above, the habitats are based on interpretation of aerial photographs taken in 2002. Although we have made some updates based on known changes since 2002, the maps do not capture all of our most recent habitat management. They represent the habitat conditions in approximately 2005.

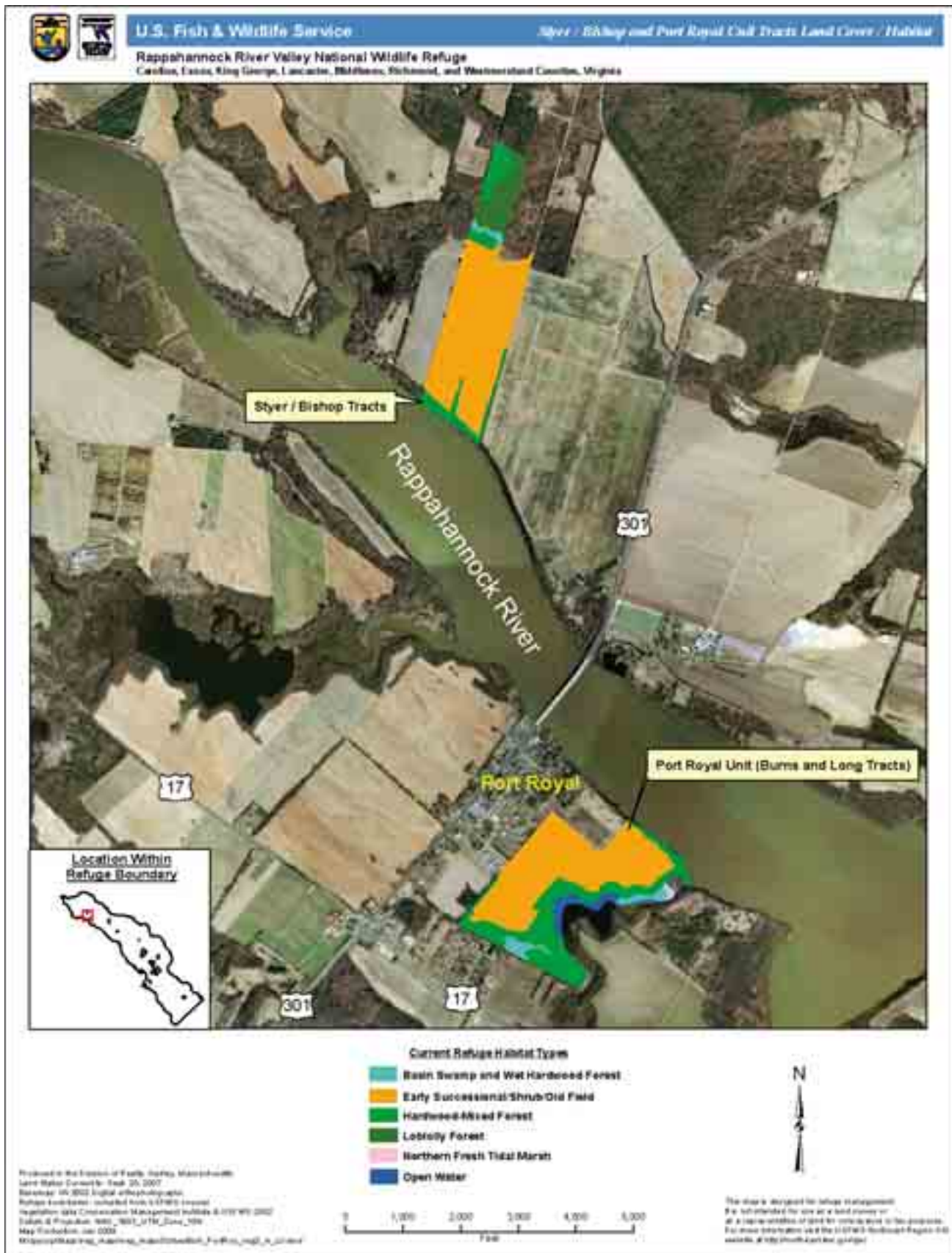
Federal- and State-Listed Plants

In 2001, we contracted with the Virginia Natural Heritage Program (VNHP) to conduct a natural heritage inventory in the project area. Most of the following information derives from the summary report of that survey (Belden et al. 2002) and other reports from the VNHP (such as First and Second Approximations), and from observations of the refuge biologist, staff, and trusted sources.

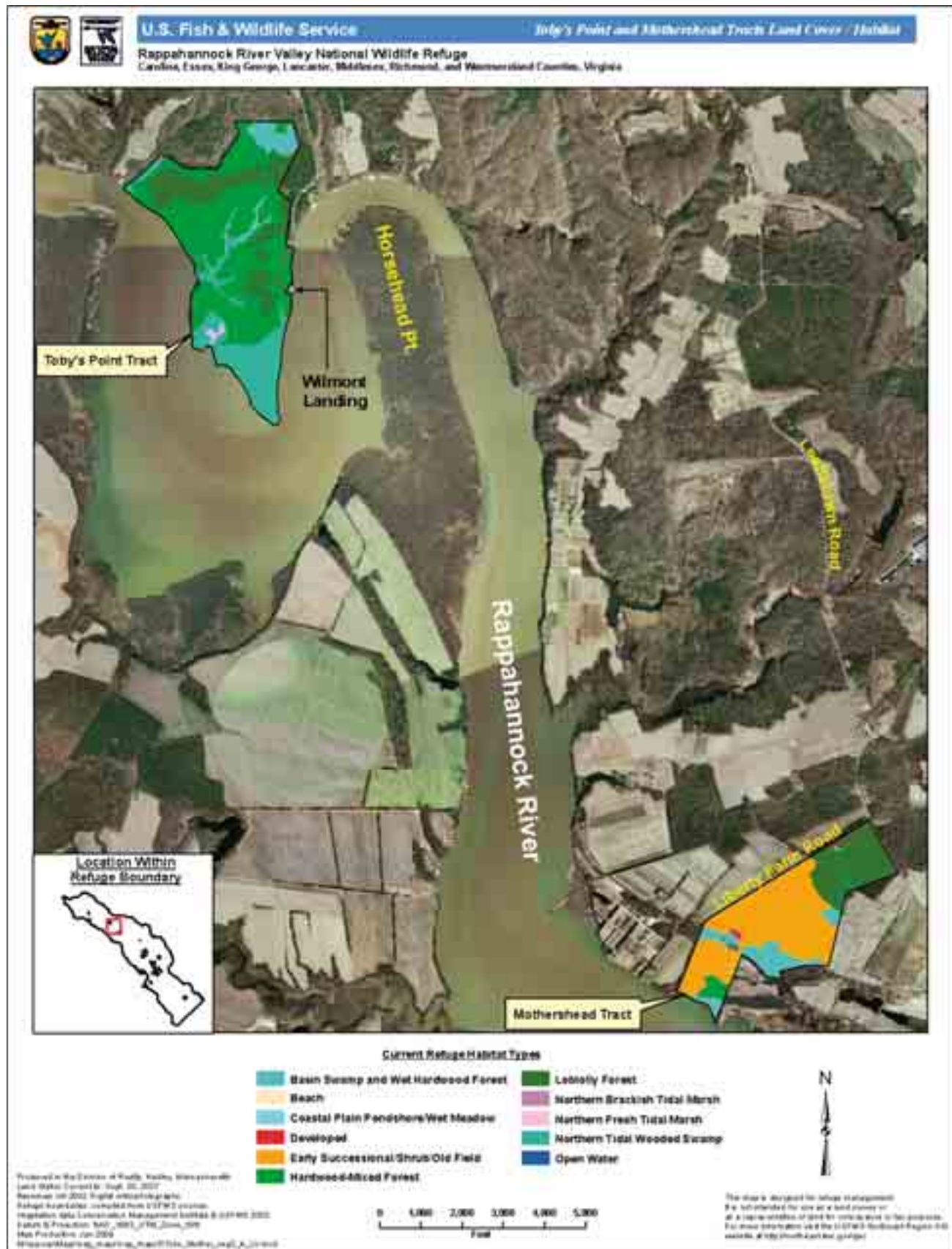
We list after each plant its Natural Heritage Program ranking. NatureServe and its natural heritage member programs developed that ranking system to promote a consistent method for evaluating the relative imperilment of species and ecological communities. In Virginia, the VNHP maintains the database and rankings.

Determining which plants and animals are thriving and which are rare or declining is crucial for targeting conservation toward those species and habitats in greatest need. The rankings provide an estimate of extinction risk, while for ecological communities they provide an estimate of the risk of elimination. Conservation status rankings are based on a one-to-five scale, ranging from critically imperiled (1) to demonstrably secure (5). Status is assessed and documented at three distinct geographic scales: global (G), national (N), and state/province (S). Those status assessments are based on the best available information, and consider a variety of factors, such as abundance, distribution, population trends, and threats. Appendix A provides further definitions. See also (<http://www.natureserve.org/explorer/ranking.htm#interpret>).

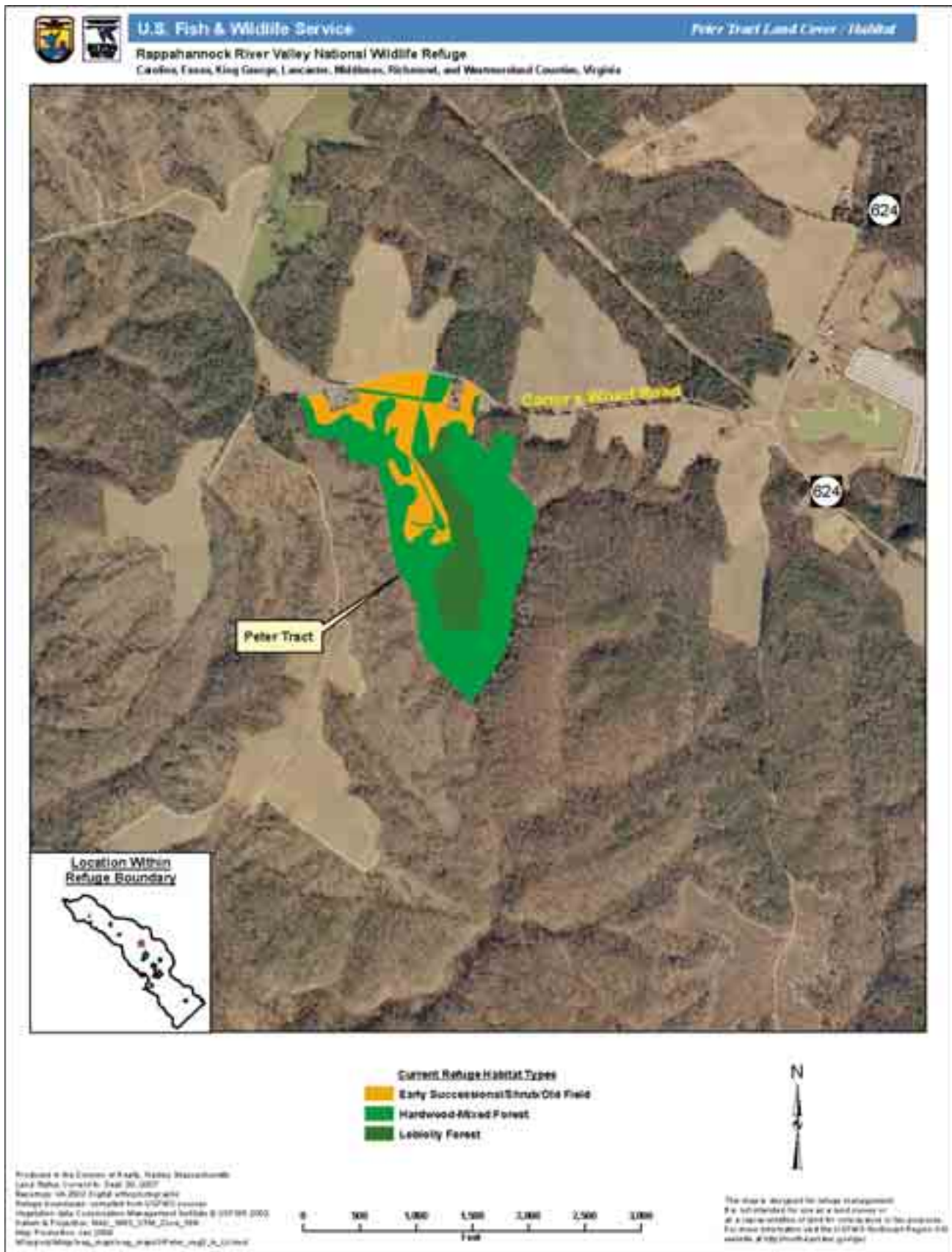
Map 3.2. Habitat types on the Styer/Bishop and Port Royal Unit Tracts



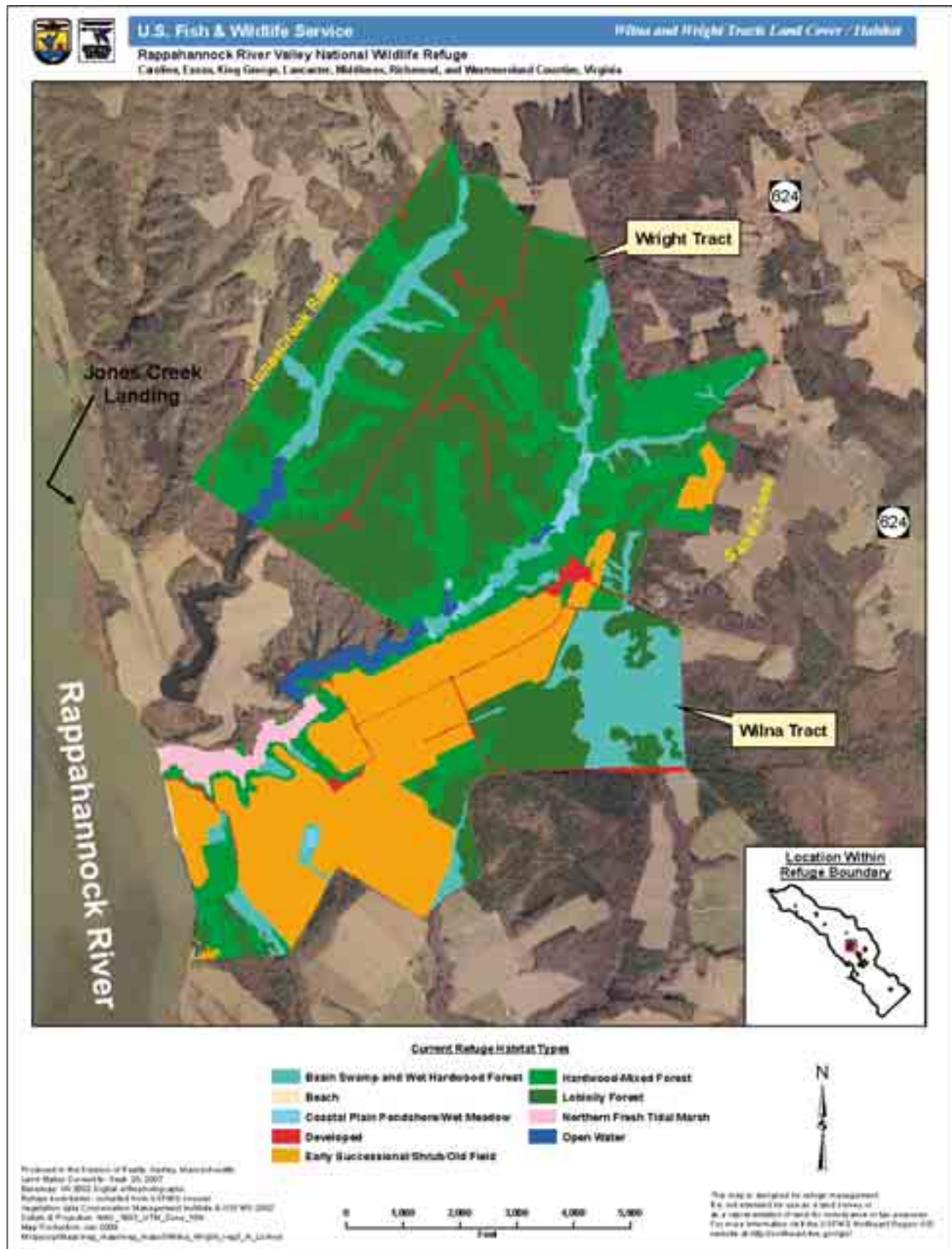
Map 3.3. Habitat types on Toby's Point and Mothershead Tracts



Map 3.4. Habitat Types on the Peter Tract



Map 3.5. Habitat types on Wilna and Wright Tracts



Chapter 3. Existing Environment

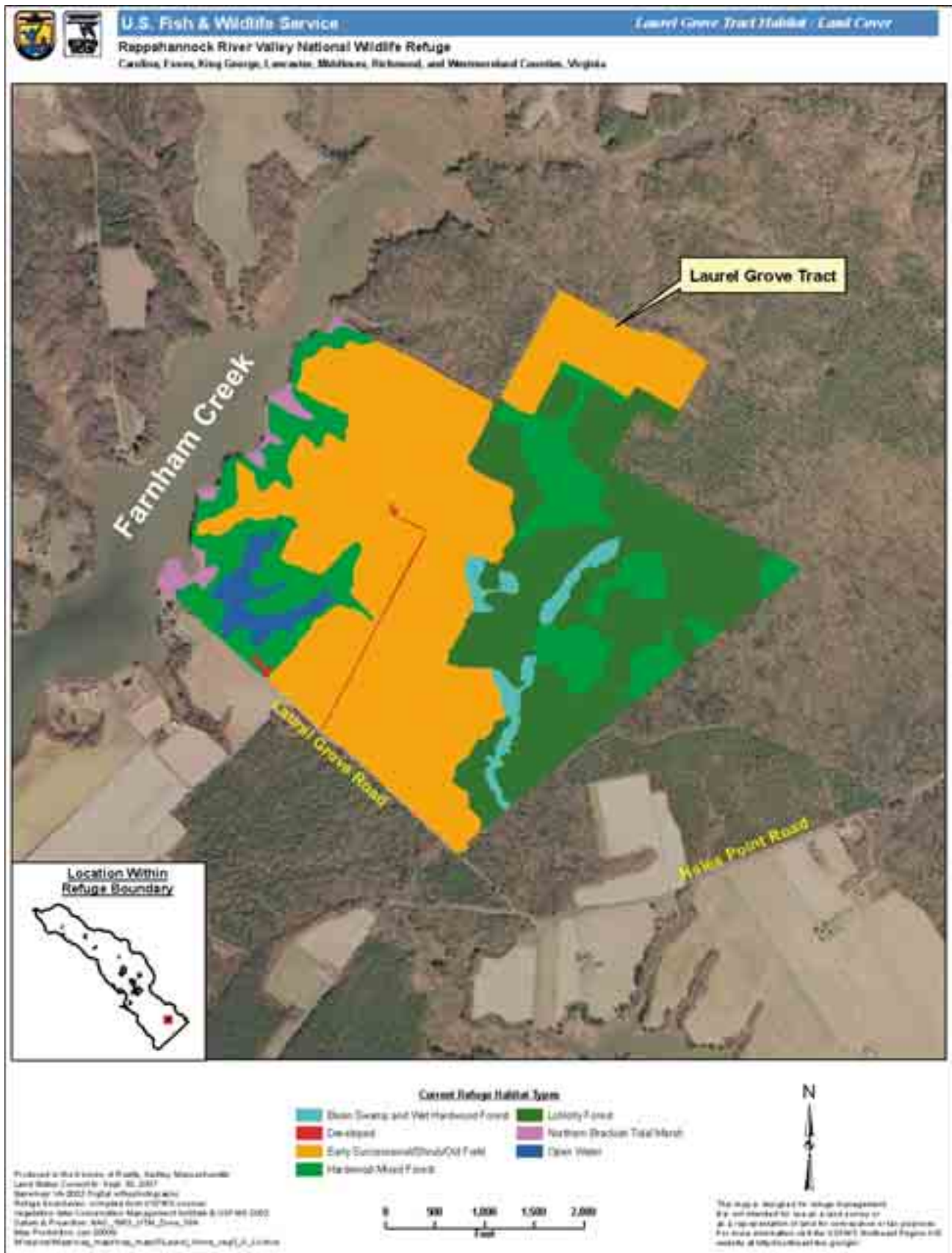




Chapter 3. Existing Environment



Map 3.9. Habitat Types on the Laurel Grove Tract



- Sensitive joint-vetch (*Aeschynomene virginica*, L.) (G2, S2, Federal threatened): This plant is Federal-listed as threatened. Scattered populations have been discovered along the marshy edges of the Rappahannock River brackish tidal zone, mostly in protected creeks, such as Piscataway, Occupacia, Brockenbrough, and Mount Landing Creek, and a few individuals were observed on Mulberry Point on the Rappahannock River. Where it is known to grow on the refuge, we are actively monitoring and protecting it from disturbance.
- River bulrush (*Bolboschoenus fluviatilis* I and II) (G5, S1): This type of sedge plant has been located in four sites in and around Cleve Marsh and in tidal marsh opposite Nanzatico Bay.
- Lake-bank sedge (*Carex lacutris*) (G4, S1): This plant has been located in Cleve Marsh.
- Parker's pipewort (*Eriocaulon parkeri*) (G3, S2): This plant has been located in Drakes Marsh.
- American ginseng (*Panax quinquefolius* L.) (G4, S4): This species occasionally is encountered in forested ravines and hollows (Spencer personal observation).
- Fragrant ladies' tresses (*Spiranthes odorata* Nutt.) (G5, S3): A small population of this orchid was found adjacent to a freshwater tidal marsh in upper Mount Landing Creek near a stand of *Aeschynomene virginica*.
- Freshwater cordgrass, prairie cordgrass (*Spartina pectinata*, Link) (G5, S2): A small population was found about 500 meters downstream from Carters Wharf (same side) and reported in 2001.
- Common reed, native (*Phragmites australis* subsp. *americanus*) (recently described, not yet ranked): This plant recently has been described (Saltonstall et al. 2004). A few stands have been identified in the refuge area on Cat Point Creek, Occupacia Creek, and Peedee Creek, all of which are tidal, brackish-to-fresh creeks.
- Quillwort species (*Isoetes* spp.) (G2, G3, S1): A specimen was collected by Allen Belden, Jr. in 2001 from a tidal freshwater mudflat along the Rappahannock River about 0.06 mile (0.1 kilometer) north of Owl Hollow, and tentatively identified by Dr. Rebecca Bray of Old Dominion University as *Isoetes hyemalis*, or winter quillwort, which is both a globally rare and state rare species. Confident identification awaits a site visit when the plant's spores, the primary means of identification, are mature (Belden et al. 2002).

The following list is of plants that may occur on the refuge, but we have not documented them yet.

- Swamp pink (*Hellonias bullata*) (G3, S2/S3, Federal threatened). This plant is associated with the coastal plain acidic seepage swamp natural community type (over sand and gravel deposits).
- Small-whorled pogonia (*Isotria medeoloides*, Pursh) (G2, S2, Federal threatened). Typically, it is found in mature forest stands with a sizable component of white oak (*Quercus alba*), other *Quercus* species, and American beech (*Fagus grandifolia*). It favors forests with open shrub and herb layers, and often is found near small canopy gaps caused by tree mortality. The refuge area has substantial quantities of these habitat conditions, so the prospects are good that it may be present.

- Kentucky lady's slipper (*Cypripedium kentuckiense*) (G3, S1): This state-listed orchid is associated with coastal plain basic seepage swamp natural community type. It was found first on Northern Neck in 1955 in Lancaster County just east of the refuge project area, and 285 miles from the nearest known locality in what is now an Audubon natural area, Hickory Hollow (Belden et al. 2002). It has been blooming there annually in recent years, and has attracted many visitors.
- Virginia least trillium (*Trillium pusillum* Michx. var *virginianum* Fern.) (G3, T2, S2) was recently found blooming in a small marshy area of a golf course in Kilmarnock (Tom Teeple, Northern Neck Audubon Society, personal communication 2006) and near Fredericksburg (Ann Messick, Northern Neck Chapter of Virginia Native Plant Society, personal communication). The "T2" addition to the ranking indicates that it is this particular variety of trillium which is of global concern due to its very limited range and small population.
- Eastern prairie fringed orchid (*Platanthera leucophaea*) (G2, N1): is a federally threatened perennial herb that grows in mesic prairies, wet sedge meadows, marshes edges and bogs. It grows from 8 to 40 inches tall, flowers from late June to early July and is pollinated by night-flying hawkmoths. The refuge boundary contains locations suitable for this orchid, although has not been documented to date. The species' major distribution area is the Midwest, however, Virginia has a disjunction population recorded as of 1999.

Unique and Significant Natural Plant Community Types

Tidal Freshwater Marsh

In 2002, the VNHP listed tidal freshwater marsh, if extensive in size, as a significant natural community (Belden et al. 2002). This marsh type occurs in the uppermost portion of the estuarine zone of the Rappahannock River, where a much larger volume of freshwater from upstream dilutes the inflow of saltwater from tidal influence. Salt concentrations are generally <0.5 ppt, but pulses of higher salinity may occur during spring tides and periods of low river discharge. The report named two such marshes, the Drakes and Otterburn marshes, but others exist along the river and in tributary creeks.

Cat Point
Creek
marsh



USFWS

The most common species are wild rice (*Zizania aquatica*), pickerelweed (*Pontederia* spp.), rice cutgrass (*Leersia oryzoides*), tearthumbs (*Polygonum* spp.), and beggar ticks (*Bidens* spp.), and scattered patches of sweet flag (*Acorus calamus*) and southern wild rice (*Zizaniopsis miliacea*) may be found. Outstanding examples of these diverse communities occur on the Potomac, Rappahannock, Chickahominy, and James rivers. These marshes provide the principal habitat for globally rare sensitive joint vetch (*Aeschynomene virginica*). Chronic sea level rise is advancing the salinity gradient upstream, which may result in the conversion of some into oligohaline marshes. The invasion of the exotic marsh dew flower (*Murdannia keisak*) also threatens these marshes (Fleming et al. 2001).

Mixed Mesic Hardwood Forest

When this type occurs in extensive, unfragmented stands, it is a significant natural community. Forests in this group occupy mesic uplands, ravines, lower slopes, and well-drained “flatwoods” on acidic, relatively nutrient-poor soils (Fleming et al. 2001). Typical tree composition includes flowering dogwood (*Cornus florida*), American holly (*Ilex opaca*), and American hornbeam (*Carpinus caroliniana* ssp. *Virginiana*) in the understory, and hickories (*Carya* spp.), tulip-poplar (*Liriodendron tulipifera*), oaks (*Quercus* spp.), and American beech (*Fagus grandifolia*) as the dominant canopy species. Although this coverage type is still sizable in eastern Virginia, repeated logging has reduced their quality and extent (Fleming et al. 2001). The Natural Heritage Inventory cites the forests along the Fones Cliff and Brockenbrough Creek as exemplary, although many more such sites exist in the project area.

Coastal Plain/Piedmont Acidic Seepage Swamp

This is a saturated wetland community fed by groundwater seepage discharged in a series of springs along the base of the adjacent ravine slopes. Soils are very nutrient-poor (Belden et al. 2002). Characterized by diffuse drainage with braided channels and sphagnum-covered hummocks in a sandy or peaty substrate, the habitats are generally wet and protected from fire. The Natural Heritage Inventory noted such a community at Balls Branch Swamp, a tributary of Lancaster Creek. The vegetation is usually a mosaic of shrubs and graminoid-dominated herbaceous patches (Fleming et al. 2001).

Typical dominant woody species include red maple (*Acer rubrum*), fringetree (*Chionanthus virginicus*), sweet bay (*Magnolia virginiana*), possum-haw (*Viburnum nudum*), sweet pepperbush (*Clethra alnifolia*), winterberry (*Ilex verticillata*) (Belden et al. 2002) and black gum (Fleming et al. 2001). Herbs include (at least locally) cinnamon fern (*Osmunda cinnamomea*), Atlantic sedge (*Carex atlantica*), bristlystalk sedge (*Carex leptalea*), skunk cabbage (*Symplocarpus foetidus*), small green wood orchid (*Platanthera clavellata*) (Belden et al. 2002) Collins sedge (*Carex collinsii*), twining bartonia (*Bartonia paniculata*), and the Federal-listed swamp pink (*Helonias bullata*).

If those species and geologic conditions are diagnostic, then the potential for more such sites within the project area exists, as plant communities and conditions such as these do occur in the upper reaches of the steep ravines along the Northern Neck and Middle Peninsula (Spencer, personal observation). This natural community type is relatively small, and threatened by beaver activities, agricultural pollutants, hydrologic disturbances and logging (Fleming et al. 2004). A state-listed rare herb, pineland squarehead (*Tetragonotheca helianthoides*), was located at the Balls Branch Swamp in 1940, but neither that nor the swamp pink were found in 2002.

Coastal Plain Basic Seepage Swamp

Although mostly in Caroline County (Belden, personal communication 2002), some of the characteristic plants, soils, and hydrology used to describe these

seepage swamps (Fleming et al. 2004), are also found in the less studied ravines and drainages (Spencer, personal observation) of the Northern Neck and Middle Peninsula. Hence, the likelihood is high that this type may occur in the narrow, shady drainages and ravines that fringe the Northern Neck and Middle Peninsula.

This type is described as saturated deciduous forests occurring in the bottoms of Coastal Plain ravines that have downcut into Tertiary shell deposits or lime sands. These are naturally rare, small-patch, communities known from the dissected inner Coastal Plain of Surry, Isle of Wight, York, and James City Counties, but there is at least one outlying occurrence in Lancaster County. Mucky, braided ravine bottoms and hummock-and-hollow micro-topography are prevalent. Green ash (*Fraxinus pennsylvanica*), red maple (*Acer rubrum*), and tulip poplar (*Liriodendron tulipifera*) are common canopy species. Small trees and shrubs include spicebush (*Lindera benzoin*) and southern bayberry (*Myrica cerifera*). Kentucky lady-slipper (*Cypripedium kentuckiense*) and American false hellebore (*Veratrum viride*) are rare diagnostic plants, while lizard's tail (*Saururus cernuus*), brome sedge (*Carex bromoides*), smooth bur-marigold (*Bidens laevis*), and wood reedgrass (*Cinna arundinacea*) are more common herb species. The exotic grass *Microstigeium vimineum* (Japanese stiltgrass) easily invades this community. The globally rare interstitial amphipod, *Stygobromus araeus*, is closely associated with the groundwater in shell marl deposits (Fleming et al. 2001).

Invasive Plants

The presence of invasive plants can have a major adverse impact on the biological integrity, diversity and environmental health of refuges and other natural areas. We list several plants below that occur on the refuge and are affecting native habitats. We remain vigilant to their presence and spread, and have an active program to control many of them.

Upland Terrestrial Habitats

Table 3.5 below shows the most frequent, broadly occurring invasive species that have the potential to cause stand replacement in our upland terrestrial habitats.

Table 3.5. Invasive plants in upland terrestrial habitats

Invasive Plant	Scientific Name
Tree of heaven	<i>Ailanthus altissima</i>
Autumn olive	<i>Eleagnus umbellata</i>
Multiflora rose	<i>Rosa multiflora</i>
Japanese honeysuckle	<i>Lonicera japonica</i>
Kudzu	<i>Pueraria lobata</i>
Japanese stiltgrass	<i>Microstigeium vimineum</i>
Princess tree	<i>Paulownia tomentosa</i>
Johnsongrass	<i>Sorghum halepense</i>
Lespedeza	<i>Lespedeza cuneata</i>
Chinese privet	<i>Ligustrum sinense</i>
Japanese knotweed	<i>Polygonum cuspidatum</i>
Canada thistle	<i>Cirsium arvense</i>
Bull thistle	<i>Cirsium vulgare</i>

Wetland Habitats

Common reed (*Phragmites australis*) is the most frequent and broadly occurring invasive species in our wetlands habitats, and we have an aggressive control program in place. Chapter 3 describes it more fully. Marsh dew flower (*Murdannia*

keisak) is another wetlands species of priority concern that is prevalent at Drakes Marsh.

Aquatic Habitats

Hydrilla (*Hydrilla verticillata*) is found in scattered locations within the project area (Belden et al. 2002; S. Spencer, in Brockenbough Creek, Mount Landing creek, personal observation). This could threaten diminutive mudflat plant species when mats of decaying hydrilla wash up along the shores and mudflats during fall senescence (Belden 2002).

Refuge Biological Resources

Federal-listed endangered or threatened species

As in our discussion of plant species, we refer to the VNHP ranking in describing some of the wildlife, fish and aquatic invertebrates in the discussions below.

The shortnose sturgeon (*Acipenser brevirostrum*), Federal-listed as endangered, is likely extirpated from Virginia waters (Jenkins and Burkhead 1994). No longer are any populations known from Chesapeake Bay tributaries, and only a few individual collections have been recorded in recent years. Historically, this sturgeon probably inhabited all of the waters between the Delaware River in New Jersey and the Cape Fear River in North Carolina (VA WAP 2005). It spawns in freshwater, typically above tidal influence, in areas with swift current and gravel or pebble bottom and water temperatures are between 9°C and 12°C.

The De-listing of the Bald Eagle

During the development of this plan, the bald eagle was removed from the federal list of threatened species, but the Bald and Golden Eagle Protection Act, the Migratory Bird Treaty Act, the National Bald Eagle Guidelines (May 2007) and the Virginia bald eagle management guidelines still afford it special protection. It will retain its threatened status under the Virginia Endangered Species Act. Protecting and enhancing eagle habitat on the river remains a priority on this refuge, and consistent with one of the purposes for establishing it. The bald eagle nests and roosts on refuge lands.

Ecology and Importance of the Bald Eagle on this Refuge

The Chesapeake Bay–Virginia population of bald eagles favors mature, super-canopy trees that overlook a broad expanse of marsh, river, or fields with relatively clear understory below and in close proximity to water bodies where fish are abundant. In Virginia, bald eagles more frequently use pines, but nests also appear in beeches, sycamore, and bald cypress. Pines, hardwoods, or snags with extended branches free of obstructing vegetation are favored perches. The forested riparian habitats along the tidal portion of the Rappahannock River are ideal bald eagle habitat.

The Rappahannock River continues to be one of the most important geographic areas for the eastern population of breeding bald eagles, based on the results of the Virginia Bald Eagle Breeding Survey. The survey is now in its 31st consecutive year, and covers the tributaries of the Chesapeake Bay up to their Fall Lines. It determined that bald eagles occupied 453 territories in Virginia during the 2005 breeding season. Compared to 2004, that represents a 5.8-percent increase in the breeding population. That rate generally is lower than the one documented throughout most of the history of the survey. More than 90 new nests were mapped in 2005. Many of those represent relocations within existing territories, although a substantial number of new territories were discovered. The number of active nests increased by 7.0 percent compared to the previous year (Watts and Byrd 2005). By comparison, the survey determined that 435 bald eagle territories were occupied in Virginia during the 2003 breeding season. When compared to 2002, that represents a 19.8-percent increase in the breeding population. More than 120 new nests were mapped in 2003. The number of active nests increased by 12.8 percent compared to a 5.1 percent increase for the previous year (Watts and Byrd 2003). By 2007, the number of occupied territories jumped to 560 (Watts and Byrd 2007).

Most of the occupied territories continue to be found in the coastal plain (Watts and Byrd 2005). Breeding densities vary considerably over the survey area, with tidal fresh reaches of the major tributaries supporting three to four times the breeding density of areas around more saline waters (Watts et al. in press). Despite high breeding densities around less saline waters, much of the growth in the breeding population continues to be along these same waters (Watts and Byrd 2005).

The Rappahannock River portion of the breeding Virginia bald eagle population mirrors the overall growth trend. In 2007, 143 territories were occupied (adults associated with a nest) and 139 active nests (birds incubating or eggs in nest) (Watts and Byrd 2007). In 2005, 120 territories were occupied and 113 nests were active on the river. In 2004, 109 territories were occupied and 100 nests were active. In 2003, there were 116 and 84, respectively, and in 2002, 91 and 86, respectively (Watts and Byrd 2005 and 2003). Westmoreland, King George, Richmond, Essex, and Charles City counties continue to support the highest number of pairs in the state. Those five counties alone account for 37.1 percent of the state population (Watts and Byrd 2005). All but Charles City County are in the refuge project area.

The Rappahannock River is also important for wintering bald eagles. River surveys by boat conducted in December, January, and February over the past 10 years show an astonishingly high density of wintering eagles, ranging between 141 and 395 eagles along a 30-mile stretch from Tappahannock to Rappahannock Academy above Port Royal. The highest concentration of eagles is found in Cat Point Creek (Portlock, unpublished data; Portlock, Cooper, and Spencer, 2005–2006, unpublished survey data). Increasing concentrations of eagles along the oligohaline (brackish-fresh) portion of the river has prompted the State Non-Game Wildlife Division to revise earlier maps of the bald eagle concentration area to include the Tappahannock section of the river and Cat Point Creek.

Abundant food resources (catfish, perch, wintering waterfowl) may account for the high concentration of eagles along this stretch of the river, which attracts wintering populations from the north and juveniles from the south (Watts, personal communication, 2005).

Shoreline development, the removal of trees for residential vistas, and the replacement of natural shoreline vegetation with revetments threaten the quality of riparian habitat of the bald eagles. Development and rezoning is increasing rapidly in Lancaster and Northumberland counties, just south of the project area, and in Stafford County, just north of the project area. Richmond County approved preliminary applications for four major subdivisions on Totuskey Creek.

We protect bald eagle habitat in various ways. One is fee simple acquisition or purchase of conservation easement in riparian habitat, when such properties become available from willing landowners. We recently acquired a conservation easement over a large tract of mature forest, with 5,884 feet of frontage on Cat Point Creek.

However, the appropriation process generally is too slow and funds generally too limited to keep pace with the changing real estate market. On the tracts we own or manage, we evaluate the need for maintenance, creation, or enhancement of existing or potential riparian habitats. For example, we recently conducted an understory burn in the bald eagle roost area at the Wilna tract to create a more open understory and release the larger trees from competition. We are also restoring former crop fields next to the river to forested riparian habitat through tree-planting and natural succession.

Other protective measures include

- Observing time-of-year restrictions for any disturbing public use or other types of activities occurring on the refuge;



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Blue grosbeak

- Recommending to Virginia Department of Transportation (VDOT) some modifications for a new bridge across Cat Point Creek that would limit impacts to bald eagles from boat traffic;
- Supporting bald eagle surveys on the river to obtain data on the status and changes in eagle concentration areas; and,
- Exploring techniques for shoreline erosion protection.
- Involving our outreach and education in informing the public and local government officials about bald eagle habitat needs.

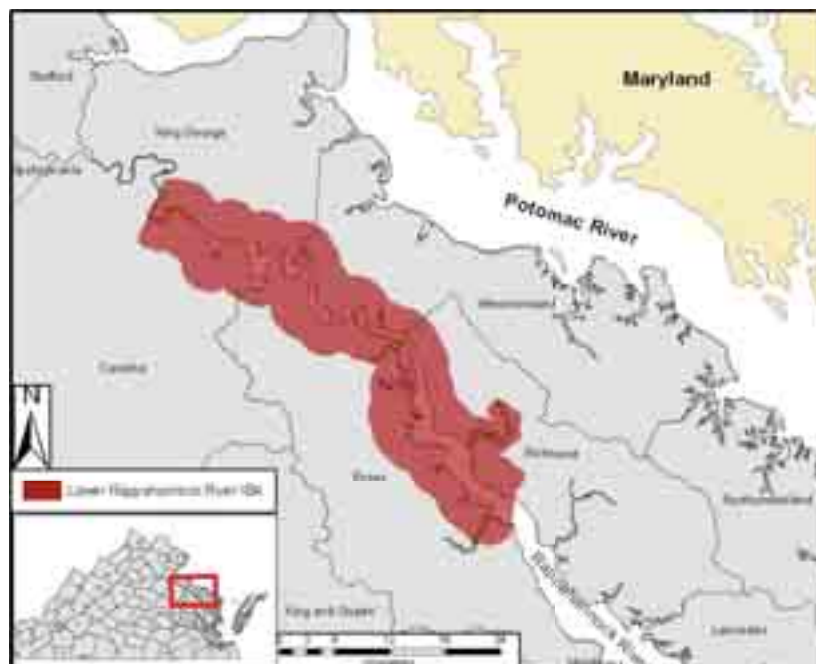
Birds

The bird assemblage in the project area is as diverse as its habitats. Some of this species diversity can be attributed to the fact that the project area lies at the geographic southern limits for many northeastern species, and at the northern limits for many southeastern species. The project area lies near the Chesapeake Bay, which is a significant migratory pathway. Of all the breeding bird species in the Mid-Atlantic Coastal Plain, approximately 75 percent are migratory (Watts 1999).

In 2007, an area that generally coincides with the bald eagle concentration area on the Rappahannock was nominated as an Important Bird Area (IBA) (see map 3.10 below). This is a National Audubon Society designation and is part of a global network of important bird areas based on criteria such as percent population, or high concentration in a limited area or other factors. A bald eagle concentration area is defined as an area where eagles congregate in large numbers for foraging, roosting, or as stopover during migration. It is not based on nests, although there are often nests occurring within the concentration area.

The Rappahannock bald eagle concentration area was first discovered one winter in the late 1990's by Bill Portlock (Chesapeake Bay Foundation), who noted particularly high numbers of bald eagles. This prompted a more systematic and regular survey of the river's shorelines to gather data on numbers and to determine the upper and lower limits of concentration. These bounds roughly coincide with fish biomass in the oligohaline (tidal fresh) portion of the river. Maximum numbers of eagles seen during the surveys are variable, ranging

Map 3.10. Lower Rappahannock River Important Bird Area (IBA)



from low 100's to the highest thus far of 395 (February 2007), and are comprised of eagles from the north, Florida, or Chesapeake Bay in varying proportions depending on the season.

The Lower Rappahannock IBA was nominated not only due to the high concentration of bald eagles foraging and roosting during the summer and winter months, but also because of other rare species or species of conservation concern such as Coastal Plain Swamp Sparrow, Northern Bobwhite, or American Black Duck using the shoreline up to 3 kilometers inland. In 2008 the Lower Rappahannock IBA was elevated to Global Importance status.



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Yellow-breasted chat

Approximately 204 species have been confirmed to use the refuge project area throughout the year, distributed among 39 families. Of those 107 are known or likely breeders. Warblers compose the most species-rich family, with 31 species observed breeding, migrating, or wintering on the refuge or its environs (Spencer, unpublished). The bulk of the information on which birds are using the refuge and project area is obtained from several sources: point count surveys on the refuge during the breeding season; refuge marsh bird surveys; refuge winter grassland surveys; the regional grassland breeding bird surveys; Christmas Bird Counts; mid-winter flight surveys of waterfowl; and migration counts. Additional information comes from less formalized searches such as the Virginia Society of Ornithology (VSO) Foray in 2004, the VSO Annual Event on the Northern Neck 2007, bird walks, and casual observations from trusted sources. Those are all sources from which we derive our refuge bird checklist, and from which we evaluate the birds of conservation concern that could be management priorities.

In developing this CCP, we compiled a list of species of conservation concern for the project area, which includes birds on the VA WAP list, the 2007 BCR 30 Plan, the PIF Area 44 plan list, the Atlantic Coast Joint Venture Plan, our regional BCC list, and the Audubon State of the Birds watch list. Appendix A provides a summary of individual species rankings in various plans, including the BCR 30 and VA WAP. Sixty-five bird species on the refuge are identified as species of concern, that utilize forest, grassland and other early successional habitats, wetlands, and shoreline habitats. Some of those birds are found in multiple habitat types. Our land bird and marsh bird survey data will provide a resource for evaluating the refuge's potential contribution to, or responsibility for, birds of conservation concern in a broader landscape or regional context once the databases for those surveys are finalized, the data entered, and then rolled up to broader spatial scales for analysis. For example, relative frequencies can be reviewed with respect to species ranges, abundance, and seasonal distributions nationally and regionally, and estimations of the refuge's potential contribution, in numbers or uniqueness, to these species can be calculated.

Land birds

Since 2000, we have conducted our land bird point counts following regional standardized protocols on various tracts of the refuge. With at least 5 years of data, rough indices of trends, relative abundance, and simple presence-absence information can be obtained. The discussion below highlights a few species of interest for each broad habitat type.

Forests (Riparian, mixed deciduous, coniferous, early successional forest, hardwood bottomlands)

At least 37 bird species of birds of conservation concern use these habitats on the refuge and in the project area. During the breeding season (May-June-July), bald eagle, Louisiana water thrush, ovenbird, worm-eating warbler, yellow-throated vireo, wood thrush, scarlet tanager, chuck-will's widow, whip-poor-will, eastern towhee, and brown thrasher are frequently observed. Kentucky warbler is less frequently observed. The largest group of birds of conservation concern use forest habitat in the mid-Atlantic Coastal Plain. Our management to date in this habitat type has focused on protection through acquisition or easements, enhancement by

culling invasive species, or reforesting breaks to join fragments or create corridors to benefit these species of conservation concern.

Grasslands and other early successional habitats, shrub habitats—Migrants constitute about 71 percent of bird species using farmland or agricultural setting in North America, and 86 percent of bird species nest there (Rodenhouse et al. 1993). Twenty species of birds of conservation concern use the grasslands, early successional or shrubby fields and edges on the refuge or project area, including breeders such as the American woodcock (also see discussion under “shorebirds” below) bobwhite quail, grasshopper sparrow, dickcissel, field sparrow, eastern meadowlark, and whip-poor-will. Fields converted from row crops to managed grasslands have attracted sedge wrens and dickcissels. The sedge wrens (only 2 or 3 at a time) appeared for 2 years in a row at the Hutchinson tract (on August 10, 2004 and 2005). Dickcissels are an irruptive species that have appeared more frequently than expected—at first only every couple of years but in the past 4 years, annually with increasing numbers and locations. They appear to be attracted to the taller emergent vegetation in the early succession fields. Wilna had the largest population of about 10 individuals, including a breeding pair, first observed in 2007 (Spencer personal observation). Current management actions that benefit this group of birds include maintaining the early successional structure (either short grass-forb or tall grass-forb), culling out stand replacing invasive species, setting back woody encroachment, and a mowing regime that creates structural diversity in fields that are structurally uniform. The grasshopper sparrow and bobwhite quail population increased where tall, dense stands of warm season grasses were spot mowed before the growing season, creating pockets within the tall standing dead grass from the previous season, where in the previous 2 years there were none (Spencer unpublished report).

Grasshopper sparrows, although still common, are declining rapidly in the core of their range in the prairie states (Rich et al. 2004). Because the refuge project area lies in a landscape-scale agricultural context, grasshopper sparrows are locally abundant during the breeding season in suitable grassland habitat, but have been declining in the state as modern agricultural practices over the past 45 years have reduced the amount of idle land available for nesting and foraging (Watts 1999).

Other noteworthy occurrences are LeConte’s sparrow, Swainson’s warbler, Bicknell’s thrush and Canada warbler.

- The LeConte’s sparrow first was detected on the Wilna tract during the Christmas Bird Count on December 19, 2004 by our refuge biologist and then later by several birders throughout the month of January 2005. That species has made sporadic appearances in northern Virginia at the Occoquan Bay refuge, about 75 miles to the north.
- The Swainson’s warbler was heard singing and was seen throughout the bird survey season on the Hutchinson tract in 2004 (J. Drummond, 2004 unpublished survey data). That species also appears almost every year in the spring along Jericho Road at Great Dismal Swamp (R. Ake, 2007 personal communication). Targeted searches at four forested bird survey points in the project area in 2007 using playbacks (Cornell Lab of Ornithology 2001) did not produce further observations. However, a small breeding population may be in the heavily forested ravines on the Northern Neck and Middle Peninsula (B. Watts 2007 personal communication).
- The Bicknell’s thrush song and call also was detected in spring 2003, along with other migrating thrushes at the Wilna tract (J. Drummond, unpublished survey data).
- The Canada warbler was observed by two bird surveyors on three occasions on the refuge in 2002 and 2005 during spring migration (D. Lee and J. Drummond, unpublished survey data).

Wetlands (Estuarine emergent marshes, shrub wetlands, beaver meadows wet meadows, forested wetlands)

Thirty-one species of birds of conservation concern use different wetland types on the refuge or project area throughout the year. Of those, species that are not wetland obligates that also occur in upland habitats are treated as land birds here. Those include breeders such as the eastern wood peewee, gray catbird, willow flycatcher, northern parula, redheaded woodpecker, prothonotary warbler and, in the winter, rusty blackbird.

Waterfowl

Eighteen species of waterfowl of conservation concern for which the refuge or project area provides habitat are listed below, along with their conservation priority based on the 2007 BCR 30 plan and including the seasons they occur in our project area. Two of the species listed below are common breeders here: wood duck and mallard. The VA WAP also ranks most of these species as a conservation concern using their tiering system. The Atlantic Coast Joint Venture Focus Area Report (draft 2005) for the Rappahannock River identifies as priority conservation species for this area several species not listed below, the redhead (M, W), ring-neck duck (M, W), blue-winged teal (M, W), gadwall (M, W) and northern shoveler (M, W) – (Season of Occurrence code: M – Migrating; W – Winter). The redhead does not occur in large numbers in our area. Appendix A lists how each waterfowl species of concern is ranked in various state and ecoregional plans, and defines the ranking systems for each plan.

American black ducks, the waterfowl species of greatest concern, may breed here, as occasional observances of pairs or small groups in spring/summer and fall show, in addition to the much greater wintering population (Spencer; personal observation; Atwood, personal communication). In the winter, great rafts of the waterfowl that winter here can be observed on the river, bays, and coves.

The limited surveys available from which to obtain count or abundance data make it difficult to estimate how many individuals of each species on average use the river. Canada geese, ruddy ducks, buffleheads, and scaup species can be seen in the hundreds or thousands from the river during winter bald eagle surveys (Spencer; personal observation). Species that use forested swamps, marshes, and narrow wetlands are likely to be greatly undercounted.

These main sources of data provide information on waterfowl abundance in the project area: the Midwinter Waterfowl Inventory (aerial), refuge aerial surveys in 2001–2002, and Christmas Bird Count reports.

Table 3.6. BCR 30 waterfowl priority species on the refuge or project area

Species	Seasons*	BCR 30 Plan Priority
American black duck	B, M, W	Highest
American widgeon	M, W	Moderate
Bufflehead	M, W	High
Canada goose (Atlantic)	M, W	Highest
Canada goose (North Atlantic)	M, W	High
Canvasback	M, W	High
Common goldeneye	M, W	Moderate
Gadwall	M, W	Moderate
Greater scaup	M, W	High
Green-winged teal	M, W	Moderate
Hooded merganser	M, W	Moderate
Lesser scaup	M, W	High
Mallard	B, M, W	High

Species	Seasons*	BCR 30 Plan Priority
Northern Pintail	M, W	Moderate
Red-breasted merganser	M, W	Moderate
Ruddy duck	M, W	Moderate
Tundra swan (eastern)	M, W	High
Wood duck (eastern)	B, M, W	Moderate

*Season of occurrence codes: B=breeding; M=migrating; W=wintering

The most abundant waterfowl by far in the winter are the Canada geese, which raft by the hundreds along the river's shallow bays, on open water or in the numerous creeks and marsh openings. One of the largest rafting sites within the project area is the Nanzatico (Land's End) and Portabago Bay and the Occupacia Bay portions of the river. Survey data lacks the relative proportion of the Atlantic population to the North Atlantic population. However, the latter likely are concentrated more on the western shores of the Delaware Bay and lower Chesapeake Bay (BCR 30 Plan, 2007).

Mallards and black ducks are found year-round in the shallow tidal marshes and ponds. Northern shoveler, gadwall, teal, and widgeon also are found in those habitats during migration and in winter, feeding on the invertebrates, seeds, and SAV in the shallow marshes along the river and its tributaries. Diving ducks, such as scaup, ruddy ducks, redheads, canvasbacks, ring-necked ducks and mergansers, use the open river and sheltered ponds and coves along it, especially where SAV are present. Wood ducks appear to be locally abundant in the numerous forested wetlands and marshy tidal creeks in the project area. Hundreds of tundra swans are seen in the open river and in favored agricultural fields along the river.

The threats to waterfowl throughout their range include

- habitat loss and degradation;
- shoreline and waterfront development;
- invasive exotic plants (e.g., *Phragmites*) and animals;
- historic and current ditching, dredging or draining;
- urbanization and sprawl, resulting in either landscape fragmentation or the loss of the upland forests, grassland and shrubland that buffer wetlands and palustrine systems;
- mismanagement of habitat buffers;
- disturbance (e.g., jet-skis, recreational boating);
- decreased water quality from non-point-source runoff, sewage pollution, industrial pollution, and erosion and sedimentation;
- algal blooms (red and brown tides);
- conversion of row crops to pine plantation or cash crops;
- oil spills; and,
- the overuse of water resources by municipalities (ACJV Waterfowl Focus Area Reports for BCR 30, 2004).

The mute swan is an invasive, exotic species that threatens native waterfowl. Most reports and observations of mute swans in the project come from the tip of

the Northern Neck and north side of the Potomac River shore. Mute swans are aggressive, voracious consumers of aquatic vegetation, and compete or interfere with native waterfowl using an area.

Current management practices at the refuge for the benefit of waterfowl include protecting wetlands through purchase or easement, providing or advocating for upland buffers around wetlands, and controlling *Phragmites* the most prevalent invasive species affecting the marshes of the project area.

Shorebirds

Compared to the outer coastal plain, relatively few species of shorebirds use the inland habitats of the project area. Nine species of shorebirds of conservation concern (BCR 30 list) live on the refuge or project area (see table 3.7 below). Appendix A also provides a summary of how these species rank in the VA WAP and other ecoregional bird plans.

- The killdeer is the most familiar species frequently seen in the project area. Small groups of killdeer scattered throughout plowed crop fields are a common sight in winter.
- At low tide, spotted sandpiper, solitary sandpiper, greater yellowlegs, and lesser yellowlegs can be seen working the intertidal flats in the brackish emergent marshes or riparian sand flats within the project area.
- American woodcock, classified morphologically as a shorebird (i.e. it is in the *Scolopacidae* or “Sandpiper” family of birds), but using a variety of upland and wetlands habitats, is probably the most important species for which the project area could provide some regional or state-level responsibility in the winter and breeding season. In particular, there are many opportunities for the refuge to provide open-field, early succession, moist shrub habitats that would benefit woodcock. The species is present year-round (Spencer, personal observation).
- Wilson’s snipe occurs in small flocks in the marshes during the winter and spring (Spencer, personal observation)

Breeding killdeer likely are impacted by the increasing population of ring-billed and laughing gulls combing recently plowed and planted farm fields. Another threat is the gradual loss of farmland altogether to succession or other incompatible land uses (residential development, tree farm conversion). We seek to protect farmlands through purchase or easement as opportunities or funds allow, and as long as the tract lies within the acquisition boundary, but on a larger scale, there is more sprawl than our pace of acquisition can address.

Table 3.7. BCR 30 shorebird priority species on the refuge or project area

Species	Seasons*	BCR 30 Plan Priority
American woodcock**	B, M, W	Highest
Killdeer	B, M, W	Moderate
Greater yellowlegs	M, W	High
Least sandpiper	M, W	Moderate
Lesser yellowlegs	M, W	Moderate
Solitary sandpiper	M, W	High
Semi-palmated plover	M, W	Moderate
Spotted sandpiper	B, M, W	Moderate
Wilson’s snipe	M, W	Moderate

*Season of occurrence codes: B=breeding; M=migrating; W=wintering

**American Woodcock are in the *Scolopacidae* (or Sandpiper) family of birds

Waterbirds and Marshbirds

The BCR 30 plan identifies 11 species of waterbirds and marshbirds of conservation concern. They use the marshes, creeks, ponds, river shores of the refuge and our project area. Appendix A also provides a summary of how these species rank in the VA WAP and other ecoregional bird plans.

Table 3.8. BCR 30 waterbird and marsh bird priority species on the refuge or project area

Species	Seasons	BCR 30 Plan Priority
American bittern	B, M	Moderate
Black-crowned night-heron	B, W	Moderate
Coastal plain swamp sparrow	B	Moderate
Common tern	Su occ.	Moderate
Forster's tern	M, S	High
King rail	B, M	Moderate
Least bittern	B, M	Moderate
Marsh wren	B, M, W	High
Royal tern	M, Su	Moderate
Seaside sparrow	B, M	Highest, Tier IV
Sora	M	Moderate

*Season of occurrence codes: B=breeding; M=migrating; S=Spring, Su=Summer; W=wintering

Of the species of concern listed, the most visible are the Forster's and royal terns, summer residents on the brackish/fresh reaches of the river, where they are often seen perched on fish trap poles by the dozens. Marsh wrens are another highly detectible species in the cattail and big cordgrass marshes of the river and tributaries, but finding them requires venturing far out from the upland. Finding the king rail, sora, American bittern, and least bittern also requires more effort, and may require late-evening or pre-dawn forays by water into the low marsh vegetation of the freshwater tidal marshes. Least bittern and Virginia rail (not listed) were nearly always observed during the marsh bird surveys of the refuge (Spencer, unpublished) and, less frequently, the king rail and sora. Black-crowned night-herons usually are detected infrequently each spring in the alder swamps and beaver marshes. American bittern are a rare sighting during the breeding season, and are not heard calling.

Worthy of mention is the recent discovery of a small breeding population of a rarer subspecies of swamp sparrow, the coastal plain swamp sparrow (*Melospiza georgiana nigrescens*) in three marshes in the project area, one of which is protected by the refuge. Their presence initially was discovered at Mulberry Island (private land) by Fred Atwood in 2004 during the Virginia Society of Ornithology Annual Foray hosted by the refuge, and confirmed the following year, when 14 individuals were found by a team from the College of William and Mary Center for Conservation Biology. Wildlife biologist Sandy Spencer also led the CCB to another potential location, Island Farm Marsh, which proved fruitful. About five individuals were heard or seen in that location, and more singing males have been detected during marsh bird surveys in subsequent years at the Island Farm Marsh and Mulberry Island (Spencer unpublished).

The first coastal plain swamp sparrow was described from a specimen taken in 1940 along the Nanticoke River on the Eastern Shore of Maryland. Breeding bird atlas work in the 1980s showed that populations existed on the Eastern and Western shores of the upper Chesapeake Bay, but the center of abundance is in southern New Jersey and Delaware along the Delaware Bay. Recent surveys have shown a dramatic decline. Other than a few observations at Dyke Marsh on the Potomac River, there are no modern breeding records for Virginia until those recent sightings on the Rappahannock River. These two groups represent the largest concentration of breeding birds now known throughout the Chesapeake Bay (Bryan Watts, June 14, 2005, posted on Virginia Bird Listserve). Both Mulberry Point and Island Farm Marsh are tidal marshes in the oligohaline section of the river. The sparrows were in vegetation dominated by rushes, big cordgrass, and scattered *Halimifolia* spp. (saltbush or groundsel tree).

A small population of breeding seaside sparrows also has been observed at Island Farm Marsh each year at least since 2002 (Refuge Bird List 2006, unpublished data). That is noteworthy, because one source claims that the world's entire population is supported by "the band of coastal salt marsh on the edge of the eastern biome" (Rich et al. 2004), yet the collective observations of the species by birders identify it as a rare dispersant breeding up the Potomac, Rappahannock, York and James rivers (Rottenborn and Brinkley 2007).

Some other non-listed birds of interest the project area are great blue herons, which are here year-round and have numerous small rookeries along the tidal portion of the river and tributaries. Ring-billed gulls and laughing gulls are a large group in terms of flock sizes in farm fields in the winter. Although they frequently have been associated with farm fields (and now landfills) for many years, their numbers have increased (Lloyd Mundie, farmer, personal communication). Green herons also are seen year-round, although they are less common in the winter. Pied-billed grebes have been noted in the freshwater wetlands on the refuge during the breeding season (Spencer, personal observation), but their appearance varies from year to year depending on rainfall. Great egrets are somewhat sporadic in their appearance, and generally are only present in the spring and summer. In the summer, Caspian terns and an occasional common tern forage on the river and tributaries in the project area.

Fish and other Aquatic Species

A 1993 report by our Virginia Fisheries Coordinator Office Project Leader states that the Rappahannock River fisheries resources are very diverse; at least 62 fish species have been identified (Spells 1993). The species it lists fall into two main groups, finfish and shellfish, then into subgroups. The table below lists some of the most prevalent species from that report, along with their current ranking in the VA WAP. We distinguish between anadromous and catadromous fish in the table. Anadromous fish are those that spend a large portion of their life cycle in the ocean and return to freshwater to breed. Catadromous fish are opposite; they spend a large portion of their life cycle in fresh water and go to the ocean to breed. Refer to appendix A for additional details on the definition of the rankings.

*Fishing at
Wilna Pond*



Table 3.9. Common fisheries resources in the Rappahannock River and their priority in the Virginia Wildlife Action Plan

GROUP Subgroup	Species	Scientific Name	VA WAP Priority*
FINFISH			
Anadromous	Alewife	<i>Alosa pseudoharengus</i>	Tier IV
	American shad	<i>Alosa sapidissima</i>	Tier IV
	Atlantic sturgeon	<i>Acipenser oxyrinchus</i>	Tier II
	Blueback herring	<i>Alosa aestivalis</i>	
	Hickory shad	<i>Alosa mediocris</i>	
	Striped bass	<i>Morone saxatilis</i>	
Catadromous	American eel	<i>Anguilla rostrata</i>	Tier IV
Resident	Blue catfish	<i>Ictalurus furcatus</i>	
	Channel catfish	<i>Ictalurus punctatus</i>	
	Largemouth bass	<i>Micropterus salmoides</i>	
	White perch	<i>Morone Americana</i>	
	Yellow perch	<i>Perca flavescens</i>	
	Sunfish	<i>Lepomis spp.</i>	
Migratory	Atlantic croaker	<i>Micropogonias undulates</i>	
	Atlantic menhaden	<i>Clupea harengus</i>	
	Bluefish	<i>Pomatomus saltatrix</i>	
	Spot	<i>Leiostomus xanthurus</i>	
Nursery	Atlantic croaker	<i>Micropogonias undulatus</i>	
	Atlantic menhaden	<i>Clupea harengus</i>	
	Spot	<i>Leiostomus xanthurus</i>	
SHELLFISH			
Benthic	Eastern oyster	<i>Crassostrea virginica</i>	
	Hard clam	<i>Mercenaria mercenaria</i>	
Epibenthic/migratory	Blue crab	<i>Callinectes sapidus</i>	

*Rank in the Virginia Wildlife Action Plan, 2005. See Appendix A for additional details on ranking. Tier I species are in critical need of conservation action; they are at extremely high risk of extinction or extirpation. Tier II species are in a very high need for conservation action; they are at high risk of extinction or extirpation. Tier III species are in high need for conservation action; extinction or extirpation is possible. Tier IV species are in moderate need for conservation action; they may be rare in parts of their range, particularly in the periphery.

Alewife



Duane Raver

The report also states that certain species may be ecologically important, such as those that form the primary forage base for recreationally or commercially important fish species or terrestrial wildlife such as bald eagles, ospreys, and wading birds. Those ecologically important species include the Atlantic menhaden, bay anchovy (*Anchoa mitchilli*), gizzard shad (*Dorosoma petenense*), hogchoker (*Trinectes maculatus*), mummichog (*Fundulus heteroclitus*), Atlantic silversides (*Menidia menidia*), and rough silversides (*Membras martinica*).

As major threats to the vitality of the fish assemblages of the river, the report cited non-point runoff from agricultural and residential land uses, water diversion projects, residential development, and blockages to fish passages. Because the Embury Dam across the river in Fredericksburg was removed in 2004, fish spawning and nursery areas may advance upriver, if water quality and other habitat conditions permit. In some cases, beaver dams hamper fish passage in creeks in the project area.

Anadromous fish are a Federal trust resource, and are a particular concern for many of our conservation partners. The Chesapeake Rivers Site Plan (TNC) identifies anadromous fish as a conservation target. Researchers continually generate new information about the life histories and threats to these fish species. We obtained much of our information from extensive communications with fish biologists at Virginia Commonwealth University (VCU) studying the migration and spawning patterns of Chesapeake Bay anadromous fish populations (McIninch and Garman, personal communication 1999; TNC 2001).

Spawning areas for herring, shad and alewife, both confirmed and probable, are reported for the Rappahannock River in a 1970 Annual Progress Report for the Anadromous Risk Project (Virginia Institute of Marine Science, through the Bureau of Commercial Fisheries). The creeks in the project area were designated spawning areas because field crews found running-ripe fish, spent fish, eggs, or larvae. Those creeks are the Balls, Brockenbrough, Cat Point, Farmers Hall, Gingoteague, Goldenvale, Hoskins, Jetts, Jugs, Little Carters, Little Totuskey, Millbank, Mt. Airy Mill Pond, Mt. Landing, Mount Swamp, Muddy, Nanzatico Bay, Occupacia, Peedee, Piscataway, Portobago, Richardson, Skinker, Sluice, Totuskey, Troy, Ware, Waterview, and Wilna.

With 16,000 acres of suitable spawning habitat, the Rappahannock River ranked third after the Potomac and James rivers. In 1999, VCU evaluated the essential habitats of anadromous clupeid fishes of the Chesapeake Bay and barriers to migration. Alewives were spawning over gravel and road rubble in Hazel Run at the Fall Line and in clean sand substrates in Occupacia Creek, which was interesting, because coarse gravel or rubble is their preferred substrate. Spawning blueback herring were associated strongly with fine sand or silt substrates in deeper tidal streams and in landscapes dominated by wetlands (McIninch and Garman 1999).

During the 2002 drought year, the VCU Center for Environmental Studies sampled fish above County Bridge (route 637) over Cat Point Creek, in about the middle of the main stem. That sampling found a few species of concern in the VA WAP: alewife (Tier IV), American eel (Tier IV), mud sunfish (Tier IV), and least brook lamprey (Tier IV). You may obtain from refuge headquarters a complete list of species found during that study.

The Embury Dam in Fredericksburg formerly stood at roughly the Fall Line of the river. Below the dam site, the river is tidal with mucky bottom, and not suitable for spawning shad. Now, some of the few shad remaining may access more than 73 miles of previously blocked shad habitat according to Alan Weaver, Virginia Fish Passage Coordinator, in “People, Land and Water” (DOI, November 2003). In 2003, the VDGIF and our Harrison Lake National Fish Hatchery released about 412,000 American shad fry into the Rappahannock River at Kelly Ford above Fredericksburg.

Historically, Atlantic sturgeon (*Acipenser oxyrinchus*) were found throughout the Chesapeake Bay and its tributaries, including the Rappahannock River. Populations began to decline in the late 19th century due to commercial overfishing. Additionally, sedimentation, dredging, and excessive nutrients have led to spawning and nursery habitat loss in the bay, which could be contributing to the species’ recent decline (Secor et al. 2000). The management of Atlantic sturgeon falls under the auspices of the Atlantic States Marine Fisheries Commission interstate management plan with the goal of restoring Atlantic sturgeon spawning stock to levels that allow for sustainable fisheries and ensure viable spawning populations (VDGIF 2005). An experimental stocking program of the Chesapeake Bay led to the capture of 15 Atlantic sturgeon (seven hatchery) from the Rappahannock River in 1997. A 2007 status review of Atlantic sturgeon found that the species no longer spawns in the Rappahannock but currently uses the river as a nursery. The same report stated that the distinct population segments of Chesapeake Bay were likely (> 50 percent chance) of becoming endangered in the near future and recommends it be listed as threatened under the ESA (Atlantic Sturgeon Status Review Team 2007).

Recently, conservationists have become concerned about the decline of Atlantic menhaden, a primary food for striped bass, bluefish, sea trout, tuna and sharks, and believed to be the “breadbasket” of the bay (Chesapeake Bay Program 2006). About 106,000 tons of the small, oily fish are harvested each year for commercial uses. The firm “Omega Protein” does most of that harvesting on the East Coast, and has a large plant in Reedville on the Northern Neck. Interest groups, such as Menhaden Matter, an alliance of conservation organizations, petitioned the Virginia General Assembly to place a five-year cap on its harvest to avert depletion (menhaden is the only fishery that this legislative body regulates). In July 2006, Virginia Governor Tim Kaine announced the capping of the industrial menhaden fishery in the Chesapeake Bay at 109,000 tons per year. The goal is to bring the state into compliance with the Atlantic States Marine Fisheries Commission objective of holding the menhaden harvest in the bay at the average level of the past 5 years, while additional research is conducted to better understand menhaden’s role in the bay and determine the best way to manage the fishery to preserve it. That proposal applies only to the large-scale menhaden industry, which uses fleets of boats and spotter planes to catch whole schools of fish, and not to the commercial bait fishery, in which watermen net menhaden for use as fish and crab bait (Chesapeake Bay Foundation 2006).

The VA WAP includes 15 species of fish on their list of Species of Greatest Conservation Need. A number of those species associated with the Rappahannock River are now subject to conservation or recovery management plans to reverse declines in recruitment and viability through coordinated programs to manage the harvest and improve water quality. The Service is a partner in those programs. They include the blue crab, native oyster (*Crassastrea virginica*), American eel, Atlantic striped bass, Atlantic sturgeon, shad and river herring

(*Alosa* spp.), and bluefish. The VA WAP provides a review of the individual plans at (www.vawildlifestrategies.org).

Channel catfish, although not native, are now considered naturalized. Blue catfish were introduced more recently and have the potential to displace or impact native and naturalized fisheries in sympatric waters (Odenkirk, personal communication 2006). Other non-native species known to the project area are the common carp, largemouth bass, warmouth, bluegill, and redear sunfish.

Rare Crustaceans

The VNHP has identified and ranked crustaceans of potential interest in the project area. Little is known about extent of the full occurrence of these rare crustaceans throughout the project area, including the refuge. However, the likelihood that they may occur in other ravines with similar topography, hydrology, soils and other characteristics may be possible as only a few attempts to survey the ravines for rare species was possible during the Natural Heritage Inventory of 2001 and 2002.

Our best contribution to their conservation may be to acquire or protect the uplands surrounding the headwaters of these ravines, prevent soil and structural disturbance to these ravines, and follow or encourage private landowners to follow strict best management practices during any logging or other management activities adjacent to these ravines. A description of what we know about their occurrence in the project area follows.

- Price's cave isopod (*Caecidotea pricei*) (G3-G4, S2): Several individuals were found in 2000 in a leaf-packed seep emanating from the creek bottom at Owl Hollow. They are known mostly from cave systems in the mountains. This is the easternmost known location in Virginia for *Caecidotea pricei* (Belden et al. 2002).
- Rappahannock spring amphipod (*Stygobromus* spp.) (G1-G2, S1S2): Approximately 5–10 individuals were found in 2000 in a leaf-packed seep emanating from the creek bottom at Owl Hollow. The *Stygobromus* species have been examined by John R. Holsinger of Old Dominion University, and provisionally recognized as a species new to science. This undescribed species is known globally from only one other location, Skinkers Corner Seep in Caroline County, where two individuals were collected in 2000 (Belden et al. 2002).

Mammals

We have not conducted formal surveys of mammals, other than a small mammal survey in the summer of 2001 conducted as part of the study evaluating the habitat for grassland breeding birds.

The Virginia Fish and Wildlife Information Service database is a good source of information for expected and documented species, but not for abundance data, nor for cryptic species or endemic species, as this area of Virginia has received little survey work. The most familiar mammals are white-tailed deer, raccoon, red fox, gray fox, beaver, river otter, mink, Virginia opossum, groundhog, Eastern cottontail, gray squirrel, feral cats, and domestic dogs. Occasionally, anecdotal reports of bobcat, black bear and coyote are provided from local sources, and of these, bobcat is the most frequently reported. We know of five species of shrew and two moles. Little is known about the species composition and richness of the bat community in the project area without mist-netting or other bat detection and identification means. We suspect we have at least eight species of bats in the refuge project area, according to Lindzey (1998). None of the mammals known to inhabit the refuge is listed by the Virginia WAP as Species of Greatest Conservation Concern.

About 15 species of Cetaceans (whales, dolphins, and porpoises) have been recorded in Virginia and the western tributaries of the Chesapeake Bay, but these are rare occurrences and not likely in the relatively shallow and brackish waters of our project area.

Amphibians

Amphibians are sensitive to changes in water quality and quantity, acidification, nutrient and chemical pollution. They have permeable skin, a complex life cycle, and are often habitat specialists. As a group, they are also wide ranging. These traits make amphibians potentially excellent indicators of environmental health (Heyer et al. 1994).

Since 2001, anuran (frog and toad) call surveys have been conducted on selected tracts of the refuge with the aim of broadening the taxa of survey groups of indicator species to assess habitat quality and health, and to monitor the status and distribution of this sensitive group. Amphibians are an important component of many ecosystems because their total biomass may equal small mammals in some parts of the world and are more than twice that of all bird species (Burton and Likens 1975). Since the 1980s, scientists all over the world have been reporting a downward trend in anuran populations. In 1991, international scientists established the Declining Amphibian Populations Task Force to determine the extent and causes of all declining amphibians (DAPTF 1991). The North American Amphibian Monitoring Program (NAAMP) is part of this global DAPTF effort. In 1995, NAAMP recommended volunteer based auditory surveys as the best method for monitoring anurans. The basic methodology we follow was developed in Wisconsin and has been adopted region-wide (Mossman et al. 1998).

All of the refuge tracts provide some habitat and refugia³ for amphibians. Because of the abundant rainfall, the many ravines containing perennial or intermittent seeps, marshy freshwater creeks and beaver dams, and topography and soils that permit standing water to pond on the uplands meadows and forests, opportunities abound for the natural creation of vernal pools for mating and depositing egg masses. Agriculture and the timber industry are dominant land-uses in the project area and each involves practices that have negative impacts on the health and distribution of these sensitive fauna. These include applications of insecticides, herbicides and fertilizers; the disturbance of topsoil; and increased sunlight reaching the soils, all of which change their moisture levels. Providing vegetated buffers around moist soil units, ponds, drainages and observance of forestry best management practices are important steps toward integrating healthy habitats for herptofauna and intensive economic land uses.

Surveys conducted by VDGIF in 2003 recorded 17 species of frogs and toads in the coastal plain (Schwab 2004, unpublished data), which is 63% of the 27 known anuran species in Virginia. Of those 27 species, we have documented 12 on the refuge. The missing five are not known to occur in this section of the coastal plain. To date, the surveys have detected no uncommon species; however, this is the first time these relatively common species of the western coastal plain have been documented in this rural area.

We have attempted amphibian surveys as time and staff resources permit, or with support from partners. With more than 50 river miles to cover, a complete survey that would allow population analysis of size or trends would be a huge effort. As a result, the anuran call surveys for this refuge mostly serve to determine presence/absence, which if conducted over many years, would still be useful in providing information on what is happening to anuran populations in the project area.

The call count surveys of anurans on the refuge regularly record the following 12 species (S. Spencer, unpublished data). None is state-listed.

³ refugium : an area of relatively unaltered climate that is inhabited by plants and animals during a period of continental climatic change (as a glaciation) and remains as a center of relic forms from which a new dispersion and speciation may take place after climatic readjustment—Webster's Third New International Dictionary, ©1986

Table 3.10. Twelve species regularly counted on anuran call surveys

Species Name	Scientific Name
American toad	<i>Anaxyrus americanus</i>
Fowler's toad	<i>Anaxyrus fowleri</i>
Eastern cricket frog	<i>Acris crepitans crepitans</i>
Cope's gray treefrog	<i>Hyla chrysoscelis</i>
Green treefrog	<i>Hyla cinerea</i>
Northern spring peeper	<i>Pseudacris crucifer</i>
Upland chorus frog	<i>Pseudacris ferarium</i>
American bullfrog	<i>Lithobates catesbeiana</i>
Wood frog	<i>Lithobates sylvatica</i>
Northern green frog	<i>Lithobates clamitans melanota</i>
Pickerel frog	<i>Lithobates palustris</i>
Southern leopard frog	<i>Lithobates sphenocephala</i>

We do not survey regularly for other amphibians and reptiles. In June 2005, our refuge biologist arranged for the Virginia Herpetological Society (VHS) to hold its annual meeting on the Northern Neck and conduct field trips on the refuge. In one weekend, they recorded 35 species of amphibians and reptiles, including 6 salamanders, 8 turtles, 2 lizards, and 9 species of snakes. Many of those were previously undocumented in the county. Ongoing surveys by VHS and casual observations by staff since 2005 have helped to build upon the anuran call surveys to augment the refuge species lists with respect to amphibians. See appendix A for a list of reptiles and amphibians on the refuge and definitions of the tier rankings mentioned below.

Reptiles

Snakes and Snake Health Study

Two species of snakes listed in the Virginia Wildlife Action Plan were observed on refuge property or in the project area: the hognosed snake (*Heterodon platirhinos*) (Tier IV), and the rainbow snake (*Farancia erythrogramma erythrogramma*) (Tier IV). Also added to the refuge species list after the VHS field trips are smooth earth snake (*Virginia valeriae*), and a ring-necked snake (*Diadophis punctatus*). The project area lies in the zone of intergradation between *D.p. edwardsii* and *D.p. punctatus*.

We expect to find a few more species of snakes in the project area that have not been documented: the corn snake (*Elaphe guttata guttata*), mole king snake (*Lampropeltis calligaster rhombomaculata*), milk snake (*Lampropeltis triangulum triangulum*), northern scarlet snake (*Cemophora coccinea copei*), northern brown snake (*Stoneria dekayi dekayi*), and northern red-bellied snake (*Stoneria occipitomaculata*).

Since snakes are usually territorial and remain close to the ground in the same localities, they are potentially good indicators of environmental contamination or damage. Moreover, snakes are upper level carnivores, and thus, their illnesses may reflect infections or environmental damage to various other life forms. During the VHS 2005 field searches, a number of snakes were found to have lesions on their skin and eye infections. That phenomenon occurred irrespective of species.

That prompted one of the VHS members, a pathologist, to return with experienced volunteers to collect snakes to determine the incidence, severity,

histopathology, and microbial characteristics of external skin lesions in snakes at the Rappahannock River Valley refuge and two other refuges in the complex, the James River and Presquile refuges. That study, begun in 2006 to span 3 years, surveys each site in the spring and fall of each year. Those surveys should verify whether the incidence and severity are greater among snakes living in the more industrially or agriculturally exposed locations, provide unique baseline data on snake health, and test the value of conditions observable in the field as indicators of environmental conditions.

Although the incidence of lesions declined over subsequent surveys, a few snakes had some infections. The most commonly observed external skin lesions were necrotic or swollen scales infested with fungi. In some cases, the lesions were deeper than in others. One black racer exhibited a swollen mass, which was due to infection with *Pseudomonas* spp. bacteria.

In spring 2007, we began to pit-tag the snakes at all of the refuges, so that we can identify re-captures in the future. Among both black racers and northern water snakes, multiple *Strongyloides* parasites were found in the mouth of some snakes. Protozoan parasites (most likely Hepatozoa) infected some erythrocytes in the blood smears from most water snakes and some black racers. That is not a serious problem, unless the infection is so high as to cause anemia (Ware, unpublished data).

Lizards and Turtles

Most of the information about other reptiles such as lizards and turtles comes from the ongoing VHS-VCU snake health survey participants. These surveys typically produce few catches, so surveyors will examine any reptile they can observe during the spring and fall, such as: eastern fence lizard (*Sceloporus undulatus*), five-lined skink (*Eumeces fasciatus*), and several species of turtle such as eastern box (*Terrapene carolina carolina*), spotted (*Clemmys guttata*), eastern mud (*Kinosternon subrubrum subrubrum*), red-bellied cooter (*Pseudemys rubriventris rubriventris*), eastern painted (*Chrysemys picta picta*), eastern snapping turtle (*Chelydra serpentina serpentina*). As with the snake study, these animals are also examined for parasites, infections, lesions, malformations. Appendix A provides a complete list of reptiles known to occur on the refuge or in the acquisition boundary.

Invertebrates

The terrestrial and aquatic invertebrate community is a significantly important component of almost any temperate or tropical ecosystem and more than outweighs all the other taxa combined, in species richness, sheer abundance, and probably, biomass. E.O. Wilson (1992) estimated that the class contained more than 750,000 described species out of the total number of known species of all organisms (at the time) of 1,413,000. That is certainly an underestimate of the actual measure of insect species, since new ones are being discovered as previously unexplored or inaccessible areas become available to science. The total number of tropical species of insects alone might well be 30 million (Wilson 1992).

Arthropods, including insects, are so vital to the functioning of the earth's biological and nutrient cycles that, if all were to disappear, humanity would probably fade within a few months, and mammals, reptiles and birds would go extinct about the same time (Wilson 1992). This group serves vital functions as pollinators, detritivores (aiding in the decomposition of matter and returning nutrients to the soil), and as a prey base to insectivorous mammals, reptiles, fish and birds. Few formal surveys for invertebrates have been conducted on the refuge, but casual observations show a rich diversity of terrestrial invertebrates such as spiders, beetles, ants, dragonflies, butterflies, moths, flies, wasps, and bees, and certainly a healthy population of ticks, chiggers, and mosquitoes.

Searches for *Odonata* (dragonflies and damselflies), using sweep nets and UV-light traps, were conducted in 2001 as a component of the Natural Heritage Inventory for the refuge. The surveys were primarily conducted in the freshwater wetland and partly in the grasslands of the refuge. Four rare species were targeted: treetop emerald (*Somatochlora provocans*, G4, S2), burgundy bluet (*Enallagma dubium*, G5, S2), Southern sprite (*Nehalennia integrigollis*, G5, S2), and sphagnum sprite (*Nehalennia gracilis*, G5, S2).

Of the moths and butterflies (Lepidopterans), three species were targeted: two-spotted skipper (*Euphyes bimacula*, G4, S1), black dash (*Euphyes conspicua*, G4, S1S3), and rare skipper (*Problema bulenta*, G2G3, S1). These rare species were not found during the searches conducted (Belden et al. 2002). However, three watch-listed dragonflies (Division of Natural Heritage) were found: the four-spotted pennant (*Brachymesia gravida*), banded pennant (*Celithemis fasciata*), and royal river cruiser (*Macromia taeniolata*) were observed in 2001 along the Rappahannock River and its tidal marshes (Belden et al. 2002).

Twenty-nine species of *Odonata*, dragonflies and damselflies, have been documented on the refuge; 26 are from the Natural Heritage survey. Fifty species of butterfly also have been documented on the refuge, and 16 moth species. Appendix A includes species from this class of invertebrates that have been observed here.

In 2001, as a component of the regional grassland breeding bird study, a survey of the invertebrate fauna of the seven fallow fields enrolled in the study was conducted by Virginia Tech's Conservation Management Institute to measure the prey base for insectivorous grassland birds during the breeding season. Samples were collected using pitfall and sweep techniques on fields in three different tracts of the refuge: the Mothershead, Tayloe, and Wilna tracts. More than 4,500 insects were collected. The collections were sorted and identified to the level of order, but not identified to species. Fifteen orders of insects were identified.

A summary of the total numbers of individuals by order, and rate and method of capture is available upon request from the refuge headquarters. Three of the Wilna fields had the highest overall abundance of insects, possibly because those fields recently were taken out of cropland production and were overtaken by the pioneer species horseweed (*Conyza canadensis*). There was also an accompanying irruption of two arthropod species, thrips and grasshoppers (Spencer, personal observation).

In August 2008, the refuge participated in a nation-wide survey of native bees in grasslands led by the USGS. Gauging the diversity of native bees will provide an indication as to the habitat diversity and quality of grasslands and their contribution to pollinator species. All surveys were conducted on the Wilna grasslands. Insect surveys in other habitat types have not been conducted. USGS notes that the *Eucerine* species (*Melissodes* and *Svastra*) indicates high quality habitat with plenty of large composites available in the landscape (especially true for *Svastra*). Also noted is that one of their relatively uncommon nest parasites was also caught (*Triepeolus lunatus*).

Two additional species worth noting, *Lasioglossum creberrimum* and *Ptilothrix bombiformis*, are both good indicators that wetlands are in the area. *Lasioglossum creberrimum* is usually associated with low wet coastal areas and *P. bombiformis* is usually associated with Hibiscus plants, (there are tidal wetlands nearby).

Lasioglossum versatum sensu Mitchell is a species that likes southern coastal plain habitats. Its odd name comes from the fact that its taxonomic identity is being challenged and recent (but unpublished findings) indicate that this species matches what Mitchell described as *L. versatum*, but in actuality does not match the type

specimen for that species. The taxonomists will work it out in the near future and a new name will be given.

With respect to patterns among fields, there is a lot of conformity among these neighboring fields as far as species types and numbers go. No field appears much different from the others except that Wilna Field 7 has elevated numbers of *M. comptoides* for some unknown reason (Droege and Shapiro 2009). Appendix A includes known insect species for the refuge, but the native-bee survey results are provided below.

Table 3.11. Native bee species documented during native bee survey (no common names available)

Scientific Name	Wilna Field 1	Wilna Field 2	Wilna Field B	Wilna Field 4	Wilna Field 7	Grand Total
<i>Agapostemon virescens</i>	5	1	2	1	5	14
<i>Augochlora pura</i>					1	1
<i>Augochlorella aurata</i>			2			2
<i>Bombus griseocollis</i>					1	1
<i>Halictus ligatus/poeyi</i>	1	1	1			3
<i>Hylaeus affinis/modestus</i>			1			1
<i>Lasioglossum bruneri</i>					1	1
<i>Lasioglossum coreopsis</i>			2			2
<i>Lasioglossum creberrimum</i>				1		1
<i>Lasioglossum versatumsensumitchell</i>	1		2			3
<i>Melissodes bimaculata</i>					1	1
<i>Melissodes comptoides</i>	1		3	4	31	39
<i>Melissodes denticulata</i>					1	1
<i>Ptilothrix bombiformis</i>					1	1
<i>Svastra atripes</i>			1			1
<i>Triepeolus lunatus</i>		1				1
Grand Total	8	3	14	6	42	73

Where time and staff resources permit, we may also implement the Monarch Larval Survey. The monarch survey will assist the refuge in making better determinations on appropriate dates for fall mowing and burning so as not to destroy the larva of the migrating generation of monarch butterflies. There is little local data on period in the project area when last generation of the year emerges from their cocoons.



Monarch butterfly

USFWS

Insect Pests

Gypsy moth outbreaks have not yet been recorded or observed on refuge tracts. Scattered infestations of pine bark beetles have been observed on several loblollies on the Wilna tract (Spencer, personal observation).

Refuge Visitor Services Program

As mentioned in Chapter 1, the Refuge Improvement Act of 1997 listed six wildlife-dependent recreational activities as “priority uses” of the System. They are: environmental education, fishing, hunting, interpretation, photography, and wildlife observation. At Rappahannock River Valley Refuge, we currently provide opportunities for all six priority uses. When developing plans for recreational uses, we first evaluate the potential for negative impacts to wildlife, and complete a compatibility determination to ensure that the use does not materially interfere with purposes of the refuge or the mission of the Refuge System. We seek locations, and create designs, that will provide high quality wildlife experiences for visitors. We also take into account our ability to maintain programs and facilities over time with existing resources and funding. Our efforts are increased by assistance from our Friends group, volunteers, and other partners, without whose help we would be unable to develop current and proposed recreational programs.

Priority Wildlife-Dependent Recreational Uses

We identify below the current opportunities on the refuge for engaging in the six priority public uses of national wildlife refuges: hunting, fishing, wildlife observation and photography, and environmental education and interpretation. Visitors travel from within Virginia and its neighboring states to participate in those activities allowed on the refuge. The most popular are observing and photographing wildlife, hunting white-tailed deer, and fishing.

We have not conducted formal surveys of annual refuge visitation, despite our desire to do so. However, we have estimated the number of visitors by activity, from visitor contacts at refuge headquarters, road-traffic counts, program attendance, and observations by our refuge staff and volunteers. We reported the following visitor numbers by activity in 2008.

Table 3.12. Number of refuge visitors by activity in 2008

Activity	Number of Refuge Visitors
Office Visits	75
Freshwater Recreational Fishing	360
Big Game Hunting	972
Wildlife Observation	325
Nature Photography	100
Environmental Education Programs On-site	153
Interpretative Programs On-site	218
On-Site Subtotal	2,203
Environmental Education Programs Off-site	412
Interpretative Programs Off-site (includes Tappahannock RivahFest participation)	15,287
Off-site Subtotal	15,699
Total	17,902

We expect visitation at the refuge to increase in the coming years commensurately with statewide and regional trends, our community outreach program, which is raising greater awareness of refuge opportunities, and our planned development of additional visitor facilities.

Due to the layout of this refuge, we offer and manage public use differently on each tract. The Wilna tract is the only tract now open year-round, from official sunrise to official sunset. Other tracts, described below, are open only by reservation. At the Wilna tract, as with other properties, public closures could be implemented at any time in the case of emergency or other unforeseen events. No fees are associated with recreation on the refuge, except the white-tailed deer hunt application and permit fees. Maps 3.2 to 3.6 in chapter 3 depict the existing and proposed public use infrastructure on our existing refuge tracts. Of the combined total of 13.75 miles of roads on the refuge, 9.21 miles are open to the public. Our trail system comprises 2.40 miles.

In June 2004, we opened the Wilna tract to wildlife observation and photography, environmental education, interpretation, and recreational fishing. These programs were established in addition to previously permitted deer hunting.

- Public access is limited to designated roads and trails. You may travel the roads by vehicle, bicycle, or on foot.
- Specific refuge fishing regulations are in effect, in addition to state fishing regulations. The Refuge regulations can be found in the Code of Federal Regulations (CFR) at 50 C.F.R. § 32.66).
- Visitor facilities consist of an outdoor classroom site, which includes accessible nature trails, a 35-acre freshwater pond with an accessible fishing pier, hand-launch boat/canoe access, an accessible rest room, interpretive panels and brochures, and a parking lot that can accommodate several buses and cars. We installed interpretive panels and two additional panel frames in 2007.
- A major addition to that tract, and to the refuge, is a multi-purpose building. It provides a classroom facility for visiting school groups; a meeting room for the refuge staff, Friends group, and conservation partners; and temporary housing for refuge volunteers and researchers.
- An additional, rustic, forested trail is located near the refuge headquarters building. The Virginia Birding and Wildlife Trail, a network of wildlife trails located throughout Virginia, includes the Wilna tract.

The Tayloe tract and Port Royal Unit are included on the Virginia Birding and Wildlife Trail. Those lands, and the Hutchinson tract, are open by reservation for wildlife observation, photography, and interpretation. Each offers a small parking area and rustic roads or trails. Informational panels and brochure racks are scheduled for installation at each tract in 2008. One was installed at the Hutchinson tract in 2005. In addition, the Friends group is designing a canoe launch and a butterfly garden that, with grant approval, will be installed at the Hutchinson tract in 2008.

The refuge environmental education program is being developed with plans for outreach to area schools. The program will offer an educators workshop to provide refuge and program information to area teachers, and a take-home Educator's Guide. Visits will be self-guided, with educators designing their lesson plan geared toward the state's "Standards of Learning" requirements, and using refuge supplies (binoculars, microscopes, nets, water testing kits, etc.), as needed.

White-tailed deer hunting is permitted on designated dates, on specified tracts of the refuge. The refuge hunt permits include special regulations to maximize hunter safety and minimize damage to refuge resources. The fees charged for refuge hunt permits currently are \$25 for two weeks of archery hunting and \$10 per day for

muzzle-loading and shotgun. Archery hunting is available during four weeks of the six-week state season on the Hutchinson, Thomas, Mothershead, Toby's Point, Tayloe, Laurel Grove, Wright, Franklin, and Port Royal tracts. Muzzle-loader hunting is available for three days and shotgun hunting is available for six days, both on the Hutchinson, Tayloe, Wilna, Laurel Grove, Wright, and Toby's Point tracts. In cooperation with VDGIF, our deer hunt program incorporates the use of a computer registration program that receives refuge applications and performs the lottery drawing and subsequent notifications, for a hunter application fee of \$7.50.

Other Public Use Activities

Activities not allowed

In determining the appropriateness and compatibility of public uses of the refuge, we determined some activities "not appropriate," either because they were inconsistent with executive orders, Service policy, or approved refuge management plans, or because they would divert refuge resources from accomplishing priority tasks, not contribute to a better appreciation or understanding of refuge resources; or, conflict with other, priority uses.

Those are use of all-terrain vehicle use, camping, dog training and field trials, pets on trails and roads, horseback riding, jogging off-road, bicycling off-road, picnicking, swimming and sunbathing, and use of pursuit dogs for hunting. See appendix B for further justification.

Law enforcement concerns

Most visitors respect the refuge rules and regulations on public uses and activities. However, some choose not to. Since we staffed the refuge in 1999, we have observed the recurrence of several unauthorized public uses at the refuge. Those include releasing or allowing the presence of free-roaming dogs (primarily deer chase hounds), camping, trespassing on refuge beaches and other areas closed to the public, setting campfires, and illegally hunting. Since the refuge was established, we have not allowed those activities for the following reasons.

- First, except for hunting, those activities are not wildlife-dependent recreational uses, nor are they necessary for the safe, practical, or effective conduct of a priority public use.
- Second, they are likely to cause the disturbance of wildlife in critical habitats. Specifically, due to the predominant choice of shoreline locations for those activities, they cause the flushing of bald eagles from roosting areas.
- Finally, they are likely to interfere with the visitors engaging in priority public uses.

The refuge hired its first full-time law enforcement officer in 2004. Through consistent outreach, education, and enforcement, we are reducing the frequency of most of those activities. However, despite refuge regulations against them, some of those activities persist, and remain significant law enforcement issues.

Hunting deer with chase hounds, a long-standing tradition in this area, involves releasing the dogs to track and chase deer. No state or county regulations require that dogs be confined to private property. Therefore, their owners allow many domestic dogs to roam free. Unfortunately, free-roaming dogs inadvertently cross the refuge boundaries, and can cause significant disturbance and probable mortality of ground-nesting birds that use refuge grassland habitats, particularly during the breeding and nesting seasons.

To resolve that issue, we started a plan in 2006 to issue special use permits that allow dog owners or those responsible for the dog(s) access to the refuge during the state deer hunt season to *retrieve* their dogs. The permit conditions state that any dog trespassing outside of the state deer hunt season may result in the issuance of a notice of violation to the dog owner. We hope this plan will reduce the number of dogs trespassing during the critical bird breeding and nesting seasons. All unauthorized domestic animals on the refuge are subject to provisions in 50.C.F.R § 28.42 and 28.43.

Camping, trespassing on refuge beaches, and making campfires are other non-wildlife-dependent activities that have received considerable attention. Before the refuge purchased several stretches of sandy beach along the Rappahannock River, the local public regularly used those privately owned tracts for seasonal recreation.

Our increased monitoring of those properties has resulted in numerous contacts with people camping or parking their boats on refuge beaches, some apparently unaware that the property was federally owned or that their activities were illegal. By posting boundary signs along shorelines subject to trespass, and through educational contacts by law enforcement, we expect the occurrence of those activities to decrease.

Our law enforcement division suspects illegal hunting on several tracts, and is closely monitoring them in cooperation with the VGDIF Conservation Police. As before, by posting boundaries, increasing public awareness of refuge properties, the Federal regulations that apply to them, and cooperative law enforcement we expect this illegal activity to decrease.

Archaeological and Historical Resources

A number of small surveys have been done in compliance with section 106 of the National Historic Preservation Act. However, there has been no overview to identify archaeological sites in the refuge in compliance with section 110 of that act. Despite the lack of a broad survey and the small scale of the present land holding of the refuge, 36 archaeological sites are recorded on it. Of those, 16 are Native American sites dating from prior to European contact. The remaining 20 date from the late 17th to the early 20th century, and are mostly farm sites. The standing house and detached kitchen-laundry building of the Wilna Plantation were both built in the early 19th century. Both structures have been determined eligible for inclusion on the National Register of Historic Places. We use the house now as the refuge office, and the kitchen-laundry as a staff residence.

Pre-Contact Sites

The Native American occupation of Virginia appears to have begun in what archaeologists call the Paleo-Indian Period (ca. 14,000 to 11,500 years ago). However, the oldest sites identified on this refuge date to the Late Archaic Period (ca. 5,500–3,000 years ago), and most appear to date to the Woodland Period (ca. 3000 to 400 years ago). Sea level rise and erosion were fairly rapid from Paleo-Indian times until the Late Archaic, hindering the development of shellfish beds and, perhaps, discouraging settlement on the changing floodplain of the lower Rappahannock. Erosion and shifts in the river course may have destroyed Archaic and Paleo-Indian Period sites or hidden them under later alluvium. As most current refuge lands are on the floodplain and first terrace of the river, that lack of evidence for earlier sites may reflect preference in the earlier time periods for settlement on higher ground, such as the Essex Scarp. The absence of such sites may also reflect the small amount of archaeological survey that has been done on the refuge.

Overall, site density on the refuge may be quite high. A recent archaeological survey for minor road improvements on three refuge tracts involved only limited subsurface testing in short linear transects, but found nine Pre-Contact sites that

had never been reported (Marquez et al. 2008). Few of those sites revealed datable artifacts. When datable artifacts were found, they usually included potsherds from the Woodland Period, a time when corn agriculture became widespread and the Pre-Contact population was at its peak.

Following centuries of relative stability, sea-level rise has again accelerated remarkably in recent decades, and bank erosion is probably increasing in places where vegetation is not well established. Archaeological sites at the edge of steep bluffs along the river or its tributaries would be at greatest risk, especially if on outside bends of the watercourse or exposed to strong currents and wind-driven waves. Nevertheless, we are not aware of any Pre-Contact or 17th-century Native American sites on the refuge that are now experiencing erosion. However, that may be simply because we have not searched the refuge shorelines systematically for archaeological sites.

Historic Sites

The first recorded encounter between Europeans and Native Americans in the valley happened in 1603, when the crew of Captain Samuel Mace's trading ship treacherously killed a Rappahannock chief and kidnapped several others of his tribe. While a prisoner of Opechancanough in December of 1607, Captain John Smith briefly was taken to their main village (near present-day Tappahannock) to be investigated as a suspect in that crime. In August 1608, he returned during his second expedition, and fought several skirmishes with the Rappahannock, one of which occurred along the refuge shore near the mouth of either Little Carter's Creek or Mount Landing Creek.

Smith ascended the river to the Fall Line, reporting substantial villages at several locations along the bank. The Rappahannock king's village was located at Cat Point Creek, or "Dancing Point" near Warsaw, perhaps on the Tayloe tract of the refuge, certainly in the acquisition boundary (Egloff and Woodward 2006:76). Smith returned to Jamestown after brokering a local peace agreement that inadvertently disrupted the indigenous political system and set the stage for further hostilities with Powhatan.

As for the Rappahannock, they managed to hold English settlers at bay until the 1640s, and then quickly began losing their lands through a series of illegal encroachments followed by forced property sales and removals ordered by the colonial legislature. After nearly four centuries of struggle to regain their lands and retain their identity, the Rappahannock Tribe finally received recognition from the Commonwealth of Virginia in 1983. Federal recognition has been proposed several times, but has not yet been achieved.

In 1645, Bartholomew Hoskins obtained the first patent in the Tappahannock area for 1,350 acres, including the Hutchinson tract of the refuge, all on the south of the Rappahannock River. In 1655, John Green purchased 600 acres, including the Hutchinson tract, from Hoskins. This area became known as Greenfield (Warner 1971). By 1667, William Daingerfield owned 64 acres on the south side of the Rappahannock at Gilson's Creek (now Mount Landing Creek), likely to be on the refuge. A map surveyed in 1680 shows Mr. John Daingerfield's house on Gilson Creek, now Mount Landing Creek, on what is now the Hutchinson tract. The map also shows several neighbors' houses, the town, and a tobacco house (Morris 1680). A 1932 map in the service's realty records for the tract shows a house and barn in the John Daingerfield house location, and surface finds at the location indicate that there is an historic archaeological site there. Nearby, but off the refuge, site records and artifacts at the Virginia Department of Historic Resources document the eighteenth century home of John's son, William Daingerfield.

The 17th-century dwellings on their farms tended to be close to the river. By the early 18th century, a “tobacco aristocracy” of large landowners had risen to local and regional political and economic prominence. The wealthiest adopted a lifestyle in emulation of English nobility, building large mansions atop the scarp overlooking the river. A considerable number of those mansions now are listed on the National Register of Historic Places, and some are national historic landmarks. The valley’s plantation owners and their families were drawn into the political turmoil leading up to the Revolution; a large number gathered at Leedstown in 1766 to sign one of the first protests against the Stamp Act. Francis Lightfoot Lee, the owner of Menokin plantation, was a signer of the Declaration of Independence. Menokin, on what is now Cat Point Creek, was built for Francis Lighthorse Lee and his wife, Rebecca Tayloe, in 1769, and its ruin is owned by the Menokin Foundation. The Service owns a conservation easement of 325 acres of its 500 acre property. The house was documented on the Historic American Buildings Survey in 1940, and the vicinity of the house ruin includes historic archaeological sites discovered during archaeological surveys of the property for the foundation. The Menokin Foundation property contains the house ruin and the sites of outbuildings including the slave quarters, kitchen, and office building. The Service’s easement contains the plantation’s landing on the Cat Point Creek, the historic road to the landing , and visible remains of “rolling roads” built to roll hogsheads of tobacco and other products to the landing (Menokin Foundation ca. 2006).

The Wilna tract on the north side of the Rappahannock River belonged in the late eighteenth century to Robert Carter, who lived elsewhere. The property passed to the Mitchell family as the dowry of Priscilla Carter; his oldest daughter (Ryland 1976). The existing house, currently used as the refuge’s headquarters (constructed in the early 1800s), is the third house to be built on the property. The first house was closer to the Rappahannock River; according to Mary Mitchell, a descendant. The house and former kitchen still stand, and are eligible for the National Register. The tract contains several historic and prehistoric archaeological sites.

In addition to the Daingerfield house site, one of the oldest known historical sites is William Tayloe’s home farm of 1682. The approximate location of that farmstead has been identified; it definitely lies in the refuge. Most homes of that time were quite modest in scale. But William Tayloe’s house was built of brick, and supposedly had 20 rooms. After it burned in the early 18th century, the focus of the plantation shifted to a location on the scarp, known as Mount Airy, where an even larger and more impressive home was built.

William Tayloe’s descendants still occupy Mount Airy. A farmhouse must have been rebuilt on the original tract (or perhaps a second dwelling existed, such as an overseer’s quarters) as the farm continued to operate as “The Old House,” a subsidiary of Mount Airy. Another farmstead on the refuge, known as “Doctor’s Hall,” was established by other owners before its purchase by the Tayloe family in 1801 as an additional, outlying farm. Both place-names appear in early 19th century Tayloe account books and other records, each with its population of enslaved African Americans listed separately from others on Tayloe property.

The history of those tracts appears to parallel historic trends in much of the Tidewater. The Tayloe family, along with their other prominent neighbors, achieved great wealth in the late 17th and 18th centuries by farming tobacco. As tobacco production became less viable due to soil exhaustion in the late 18th century, agriculture turned to the cultivation of grain. Trade in the small ports along the river began to decline at that time.

The lower Rappahannock was not a major battleground in the Civil War. However, both sides tried to assert control of its waters. The result was numerous small engagements in which steam-powered Federal gunboats captured sailing vessels in the river, or duels between those gunboats and Confederate artillery on the south bank took place. Military earthworks were built at several places along both banks, but none is known to have been on current refuge property. With the loss of enslaved labor and overall economic depression following the war, another economic transformation occurred as large landowners converted outlying plantation lands into tenant farms. Both of the former Tayloe tracts on the refuge continued as tenant farms into the 20th century.

A number of the southernmost refuge tracts historically were owned by the Fauntleroy and Carter families, also prominent Northern Neck landowners in the late 17th and 18th century. Although no historic period sites have been identified on those tracts, sites similar to the Tayloe farmsteads appear likely. Several additional 19th- and early 20th-century farmstead sites are on refuge tracts for which early historic ownership has not yet been studied. Some of those probably have a plantation history similar to the Tayloe tracts, while others may have always remained small farms owned by less socially prominent families. We must emphasize that most of the farmsteads discovered in archaeological surveys of the refuge are in agricultural fields, and show no surface evidence; additional ones are likely to exist in similar settings. Unmarked cemeteries are said to lie in the fields of some of the refuge tracts.

Increasing steamboat traffic in the later years of the 19th century aided a gradual economic resurgence along the river, with the establishment of several regular stopping places on the routes, sometimes connected to various industrial enterprises. The refuge contains portions of one such site, a steamboat landing and brickworks, the latter a substantial operation dating from the 1890s. The

Refuge headquarters at the Wilna house



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brickworks is currently the only recorded site on the refuge that is exposed to erosion, and it appears to be eroding at a substantial rate.

Aside from what we might learn from scientific archaeological excavation at refuge sites, substantial record exists in the form of account books, diaries, and public documents relating to the Carters, Tayloes, and other early landowners. A detailed study of those records could reveal much about occupation and use of refuge lands in the 17th through the 19th century. The farming of most of these tracts continued to nearly the end of the 20th century. A few hours of conversation some years ago between Service archaeologists and a former tenant of the Tayloe tract showed that interviews with long-time valley residents would lend valuable insight into life ways and farming practices of the early 20th century, and perhaps provide the locations of unknown archaeological sites.

Historic Structures

As noted earlier, the current refuge office is the Wilna Plantation House. This large frame farmhouse is noteworthy for its attractive two-story porch, as well as an unusual decorative arch spanning its front hallway. The house and its associated kitchen-laundry building (now serving as residence for a refuge employee) both appear to have been built sometime between 1800 and 1840, but historical research of the property has been limited and their exact dates of construction are unclear. Because of their architectural significance, both structures have been determined eligible for inclusion on the National Register of Historic Places. A substantial repair of deteriorated exterior fabric on the Wilna Plantation House was recently completed. Further work has been proposed for repairs of the house interior, as well as the kitchen-laundry. Unlike the larger plantations of the Northern Neck, such as Mount Airy, not much is known of the ownership or operation of the Wilna Plantation in its heyday. Archival research would be useful for the interpretation of its structures and archaeological remains.

The Tappahannock and Port Royal historic districts, and a considerable number of historical plantation homes either adjoin current refuge tracts or lie within the approved refuge acquisition boundary. Several of those properties are listed on the National Register of Historic Places, and some are listed as national historic landmarks. Although we do not intend to acquire any of the registered historic structures, our opportunities to ensure the long-term preservation of their scenic vistas by purchasing tracts nearby from willing sellers may benefit historical preservation.

Chapter 4



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Blue goose mural

Management Direction and Implementation

- Introduction
- General Refuge Management
- Goals, Objectives and Strategies

Introduction

This chapter is in three parts. In combination, the chapter describes the array of management actions that, in our professional judgment, work best toward achieving the refuge purposes, the vision and goals developed during the planning process, and the goals and objectives of other Service, State, and regional conservation plans. We believe that implementing these actions will also effectively address the key issues raised during plan development.

The first part of this chapter, “Summary by Major Program Area”, describes the overall intent of our management as it relates to major refuge program areas. The second part, “General Refuge Management,” describes specific refuge activities that support multiple goals and objectives. The third part, “Goals, Objectives and Strategies,” describes refuge actions that were developed to achieve specific goals and objectives.

Summary by Major Program Area

Habitat Management

We will expand our intensive grassland/old field management up to a maximum limit of 1,200 acres. These management acres will include our existing 700 acres of grasslands, most of the 210 acres currently in cooperative farming, and an additional 200–250 acres of open land, of an appropriate size and shape, to be included in this management regime from future acquisitions. Cooperative farming as it exists today will be phased out by 2012, unless it is determined that farming provides an added benefit to targeted wildlife species or could be a component of our interpretive outreach program describing the history of land use in the region and its affect on wildlife. Our implementing an adaptive management approach will facilitate those decisions, by allowing us to test other practices, monitor their impacts and compare them to current management, thereby providing a substantive basis for changing the farming program as results indicate.

The maintenance of grasslands requires continuous management to keep that habitat from succeeding into shrub and forest stages and to control invasive species. Depending on the soil types, prior land use, and surrounding plant communities, grasslands may require annual, biennial or triennial treatments to return them to the desired conditions. We accomplish that most commonly by mowing and prescribed burning, but we sometime use herbicides, discing, and planting to increase plant diversity or to achieve desired structural characteristics. In addition, we may explore the use of grazing as an additional tool. Chapter 3 presents the current refuge habitat types in table 3.4 and by tract or refuge unit on maps 3.2 to 3.9.



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Prescribed burning to improve wildlife habitat

We will monitor planted or existing mixed forest habitat types for invasive species and diseases, and treat them as funding and staffing permit. We will manage planted pine forest by pre-commercial and commercial thinning, and then leave the forest to mature and, eventually, convert to mixed pine and hardwoods. We will continue to monitor tidal marshes for the presence of *Phragmites* and other invasive plants, which we will treat as funding and staffing permit. If we encounter additional opportunities to restore previously drained wetlands, we may add to the present 56 acres of wet meadows for the benefit of waterfowl and other wetland-dependent species. As opposed to large, managed waterfowl impoundments, those areas are typically small, formerly drained areas that, with minimal management, can function as vernal pools for amphibians or small feeding areas for migrating and wintering birds.

Inventories and Monitoring

We will continue existing monitoring and inventory efforts as long as they continue to provide useful information and we have the necessary resources to accomplish them. We will target any alterations or additions to these on-going surveys toward helping us understand better the implications of our management actions and ways to improve our efficiency and effectiveness. With the continuation and expansion of early successional habitats, we will likely continue to monitor the effects of our management techniques on targeted grassland species. We will also continue to seek ways to reduce our management costs for establishing and maintaining grasslands.

Visitor Services

We will expand existing opportunities for all six priority public uses, with an emphasis on two of them: hunting and wildlife observation. Maps 4.1–4.6 present current and planned public use opportunities.

We will seek partnerships to help us achieve new and expanded programs, including new observation trails, interpretive water trails (in conjunction with the Chesapeake Gateways Network), and waterfowl and spring turkey hunting. Although we will not emphasize the other four priority uses to the same degree, we will also look for partnership opportunities to continue our modest interpretation and teacher-led environmental education programs, and provide additional access for freshwater fishing.

One of the interpretive messages that we will expand upon, if resources are available, is the role that farming has traditionally played in wildlife conservation over the past century, and why refuges have evolved from planting non-native crops to re-establishing native habitats as the best way to benefit fish and wildlife. It was not long ago that the prevailing techniques for wildlife management included establishing food plots, often using annual plantings. Recent Service policy on refuges focuses on re-establishing native vegetation that historically occurred on the landscape where the refuge is located. This change in philosophy is still in its early stages and not yet well understood by many. Our planned interpretive message would acknowledge the important role that farming played in earlier eras of wildlife management, and discuss the rationale behind the more recent methods.

In expanding opportunities for compatible outdoor recreational opportunities, we hope to contribute to communities around the refuge, both in terms of health and well-being, and economically. We will join other agencies and organizations to promote connecting children with nature, thereby reducing “nature-deficit disorder.” A growing body of research suggests that a lack of direct involvement with the outside world may be contributing to a variety of maladies affecting children in today’s society (Louv 2005). By offering places and programs where children and their parents can observe wildlife in natural settings, and learn to appreciate hunting and fishing, we will contribute to the growing national initiative to reconnect children with nature.

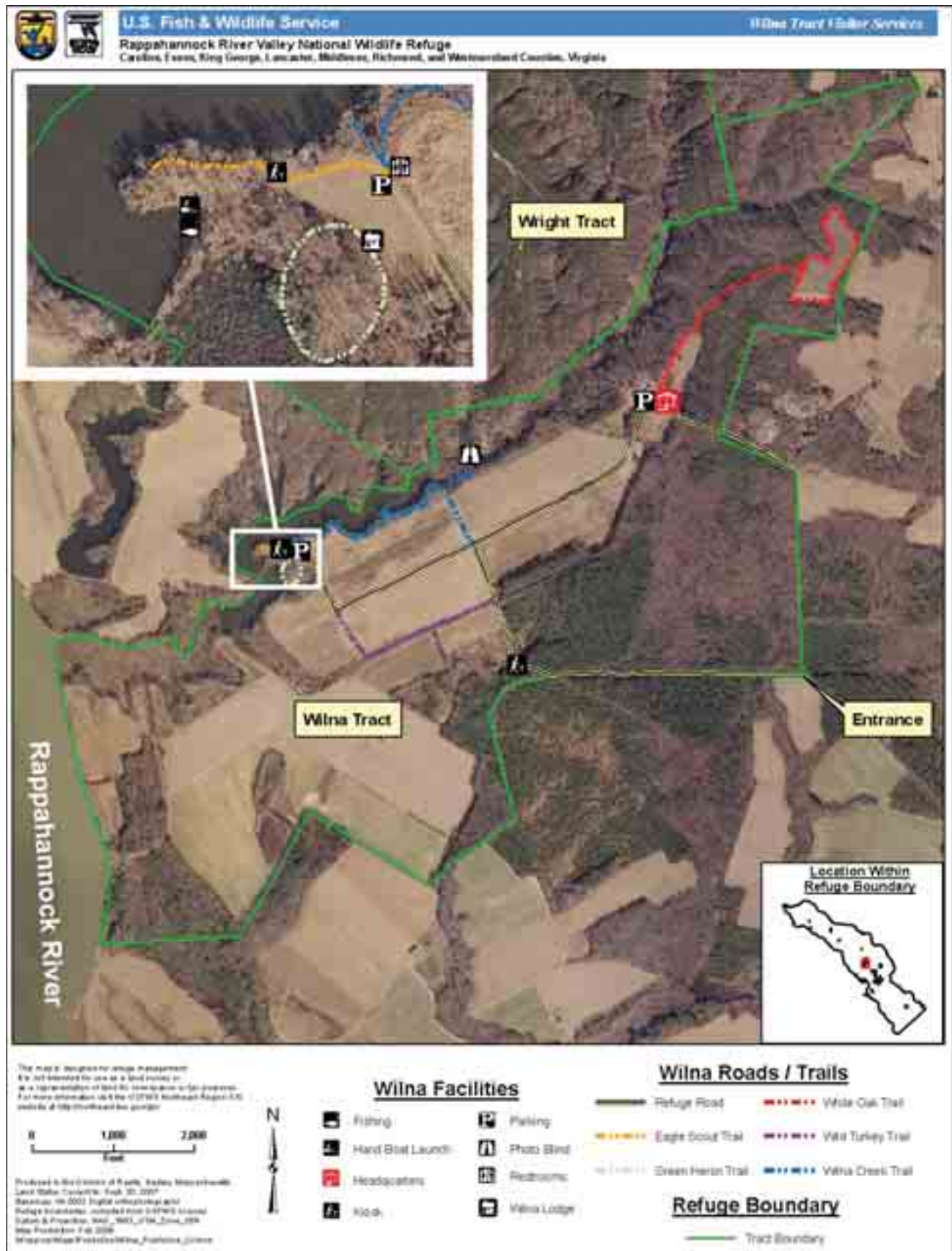
Research has also shown that by offering places where visitors can enjoy watching birds and other wildlife, local economies benefit. Benefits come in the form of increased sales by local businesses for food, lodging, fuel, and supplies and from associated tax revenues. We plan to offer opportunities in all five counties where the refuge manages land, and have contact sites planned in three of those counties (Caroline, Essex, and Richmond). We will work cooperatively with King George County to co-administer the Wilmot Landing site on the river at our Toby’s Point tract. We will nominate the refuge tract in Westmoreland County to be included on the Virginia Birding and Wildlife Trail, and will consider expanding opportunities based on future land acquisitions.

As noted previously, we plan to de-centralize our visitor contact areas in recognition of the geographically dispersed nature of the refuge. We will take advantage of this geographic spread to attract visitors from a wide area by establishing several

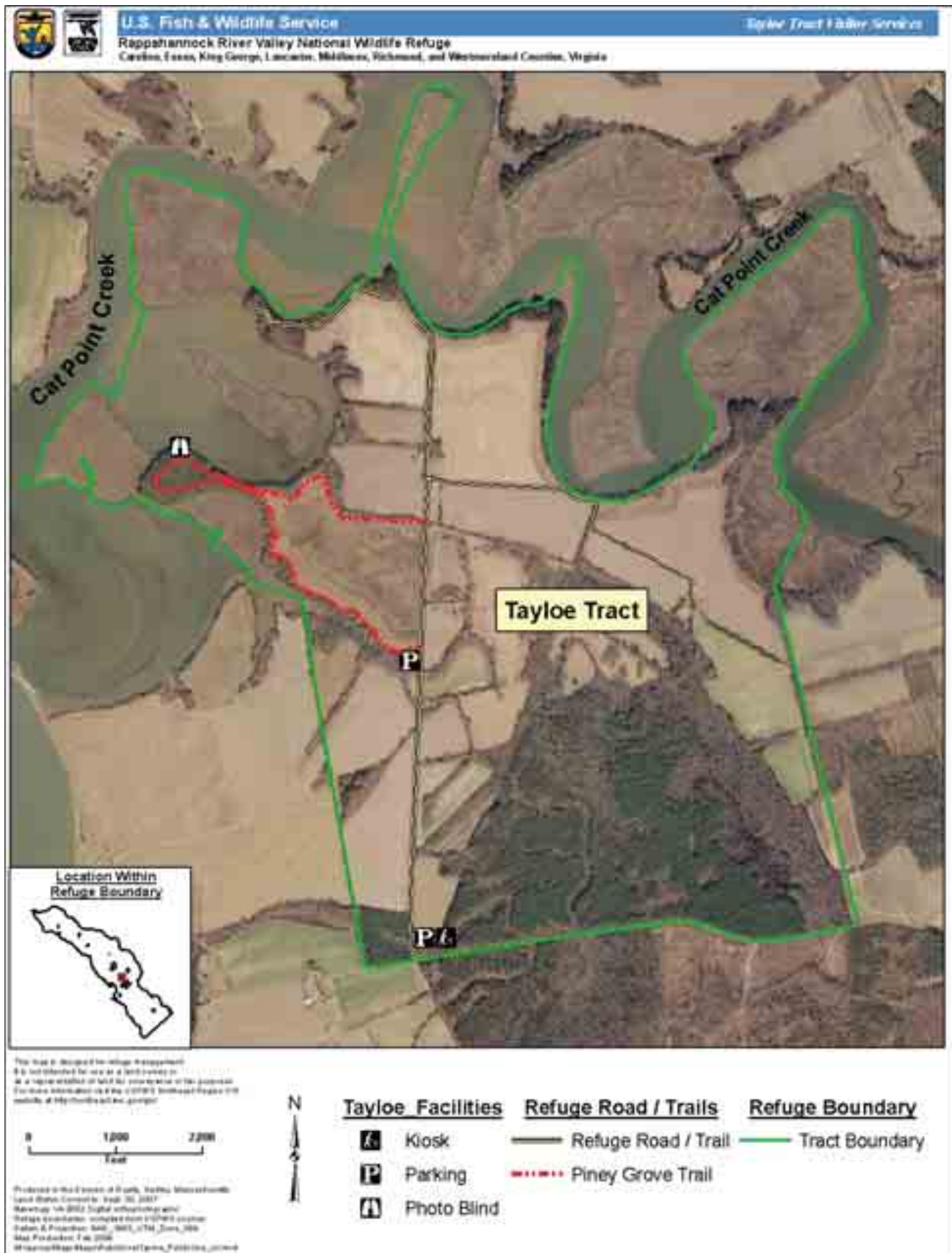
Map 4.1. Public Use on Port Royal Unit (Burns and Long Tracts)



Map 4.2. Public Use on the Wilna Tract



Map 4.3. Public Use on the Tayloe Tract



U.S. Fish & Wildlife Service
Hutchinson Tract Visitor Services

Rappahannock River Valley National Wildlife Refuge
 Caroline, Essex, King George, Lancaster, Middlesex, Richmond, and Westmoreland Counties, Virginia

Location Within Refuge Boundary

Hutchinson Tract

Hutchinson Facilities

Hutchinson Roads/Trails

Refuge Boundary

Tract Boundary

Legend:

- Canoe Launch Site
- Fishing
- Hike
- Parking
- Pavilion
- Restroom
- Hutchinson Trail
- Refuge Road

Scale: 0 to 2,000 Feet

North Arrow

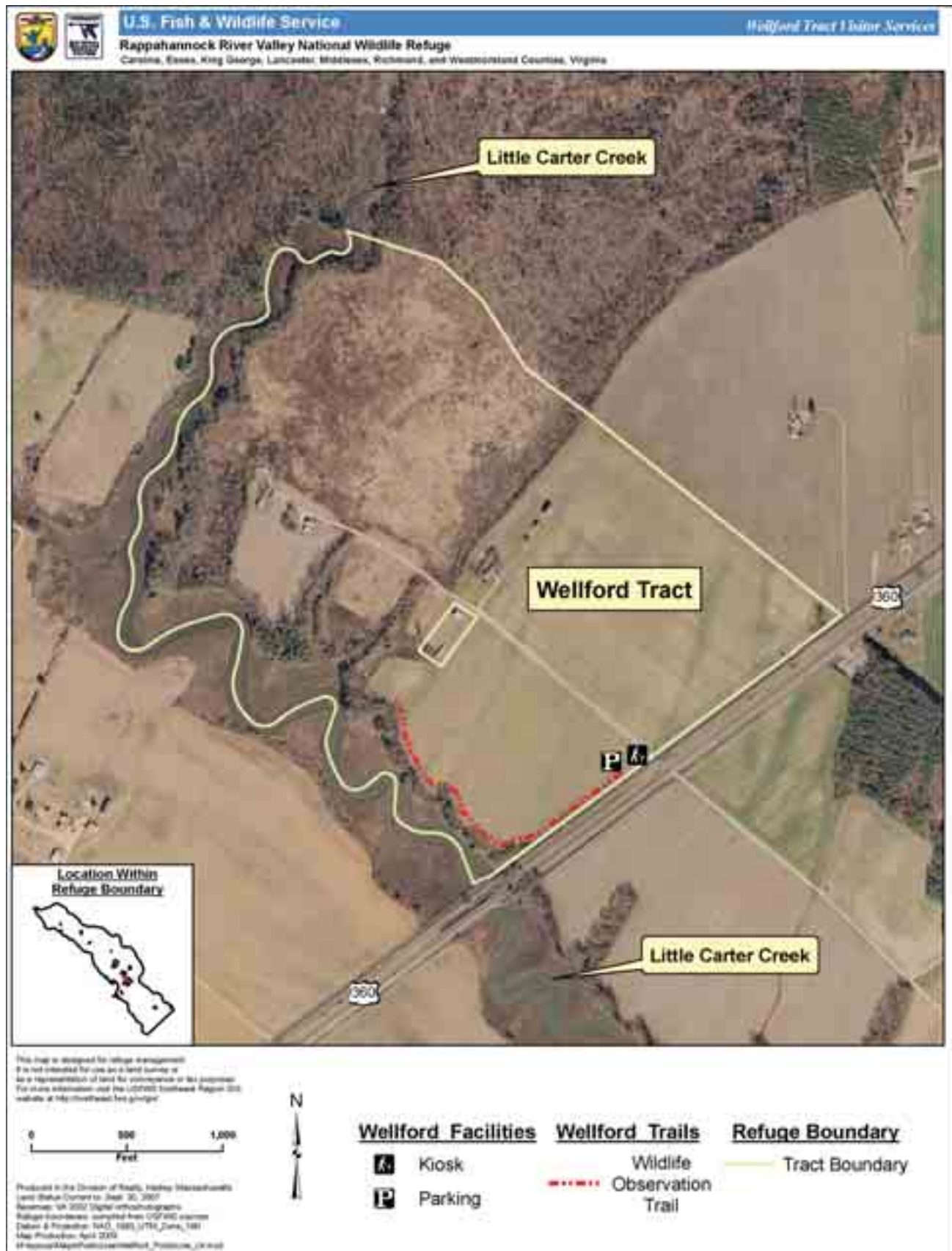
This map is designed for trip management. It is not intended for use as a land survey or as a navigation aid. It is not a warranty of any kind. For more information on the Virginia National Wildlife Refuge System, visit <http://www.fws.gov>.

Produced in cooperation with the Virginia Department of Wildlife Resources. Last Update: 10/2012. Digital cartography by: [illegible]. Map Producers: [illegible].

Map 4.5. Public Use on the Laurel Grove Tract



Map 4.6. Public Use on the Wellford Tract



strategic points of contact, using informational signs or pavilions. Washington, D.C. is only about 70 miles from our Port Royal unit, which is located near the intersection of two major secondary routes of travel, U.S. routes 17 and 301. Travelers often use them to avoid gridlock on Interstate 95. Some 7,000 vehicles per day pass the Hutchinson tract on route 17 near Tappahannock, which is approximately 50 miles from Richmond, VA. The Northern Neck of Virginia, where most of the refuge owned lands lie, is becoming an important tourist destination. The refuge includes two sites on the Virginia Birding and Wildlife Trail. Our Laurel Grove tract is conveniently located near the expanding populace of the Kilmarnock/White Stone area. Small investments in directional signage and self-service facilities at those strategic locations offer exceptional opportunities to reach many thousands of visitors and residents over the 15-year horizon of this plan.

Refuge Administration

We hope to achieve a level of staffing that meets the minimum requirements for a refuge complex of this size and importance by adding four positions: a visitor services specialist, a biological technician, a maintenance worker, and a private lands biologist. We will base any increases in staffing on available, permanent sources of funding, and will consider them in the context of regional and refuge priorities.

We seek to construct a new small refuge headquarters, using regional design standards, instead of using the 19th-century Wilna House. We would keep the Wilna House occupied to best ensure its continued maintenance. Our first option for maintaining the Wilna House would be to seek a partner to help in interpreting and protecting the historic aspects of that nationally significant structure while also educating visitors about the Refuge System and natural resource conservation. Of the currently owned refuge properties, the Hutchinson tract offers the best location for a new headquarters. If the refuge were selected as the site of a cross-program Service office, we would need to expand our headquarters building.

Rather than develop one large visitor center, we plan to create several smaller visitor contact and welcome areas at strategic locations, including Port Royal, Tappahannock, Farnham, and near Warsaw. We will seek partnerships to accomplish that: for example, sharing a facility, or sharing staff. That may require the construction of information signs and stations that would interpret specific refuge messages. If located on the Hutchinson tract, a new headquarters would serve a dual function as a visitor welcome area.

Over the 15-year horizon of this plan, the old barns now serving as maintenance and equipment storage facilities would be replaced with structures that are more modern. That is necessary to protect our investments in new equipment, including a tractor, backhoe, Bobcat®, and various attachments. The use of the travel trailers by interns, researchers, volunteers and temporary employees, and the mobile home office by the VDGIF will continue.

General Refuge Management

Introduction

The actions presented in this section represent those that were common to all three alternatives evaluated in the draft CCP/EA. These are actions required by law or policy, or represent actions that have undergone a separate NEPA analysis, public review, agency review, and approval. Or, they are administrative actions that do not necessarily require public review, but are actions we wanted to highlight in our implementation plan. Finally, most of the actions outlined in this part of chapter 4 support multiple goals and objectives, and therefore, do not lend themselves to the organization in the third part of this chapter.

Adaptive Management

We will employ an adaptive management approach for improving resource management by learning from management outcomes. In 2007, Secretary of Interior Kempthorne issued Secretarial Order No. 3270 to provide guidance on policy and procedures for implementing adaptive management in departmental agencies. In response to that order, an intradepartmental working group developed a technical guidebook to assist managers and practitioners: “Adaptive Management: The U.S. Department of Interior, Technical Guide.” It defines adaptive management, the conditions under which we should consider it, the process for implementing it in a structured framework, and evaluating its effectiveness (Williams et al. 2007). You may view the technical guidebook at <http://www.doi.gov/initiatives/AdaptiveManagement/documents.html>.

The guidebook provides the following operational definition for adaptive management:

“Adaptive management is a decision process that promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Careful monitoring of these outcomes both advances scientific understanding and helps adjust policies or operations as part of an iterative learning process. Adaptive management also recognizes the importance of natural variability in contributing to ecological resilience and productivity. It is not a ‘trial and error’ process, but rather emphasizes learning while doing. Adaptive management does not represent an end in itself, but rather a means to more effective decisions and enhanced benefits. Its true measure is in how well it helps meet environmental, social and economic goals, increase scientific knowledge, and reduces tensions among stakeholders.”

This definition gives special emphasis to the uncertainty about management impacts, iterative learning to reduce uncertainty, and improved management as a result of learning. At the refuge level, monitoring management actions, outcomes and key resources, will be very important to implementing an adaptive management process. Our grassland, invasive species, and integrated pest management activities are examples of refuge programs or activities where an adaptive management approach may be implemented.

The refuge manager will be responsible for changing management actions and strategies if they do not produce the desired conditions. Significant changes from what we present in our final CCP may warrant additional NEPA analysis and public comment. Minor changes will not, but we will document them in our project evaluation or annual reports. Implementing an adaptive management approach supports all five goals of the refuge.

Protecting Land

The Service is currently authorized to protect 20,000 acres in fee title and conservation easement within its existing, approved refuge boundary. By September 30, 2007, the refuge had acquired 6,352 acres in fee title and 1,359 acres in conservation easement, protecting a total of 7,711 acres. We will continue to work with willing sellers and in partnership with other agencies and organizations to achieve the 20,000-acre goal for land protection. We will continue to seek to increase the amount of land we protect through easements to balance better with the lands we acquire in fee title.

It is impossible to predict the size, type, and location of future acquisitions that may come under our management within the next 15 years. Although we are making a concerted effort to encourage more easement acquisitions, we do not know how successful we will be in this regard. If we were to assume we would

acquire a number of acres, both in fee and in easement over the next 15 years similar to what we have acquired for the first 10 years of the refuge, the result would be approximately 16,000 acres in fee, and 4,000 acres under easement. Because of our current emphasis on bringing up the percentage of lands in easements, we will assume, for planning purposes, totals of 12,000 acres in fee and 8,000 acres under easement within the next 15 years. Obviously, that also assumes that the congressional appropriations for land acquisition are similar to, or higher than, those over the first 10 years since refuge establishment.

The 1995 final environmental assessment (EA) that created the refuge, and its appended land protection plan (LPP), list several criteria that we use in prioritizing land acquisitions. Those criteria, not prioritized, follow.

- Large tracts that exhibit a high degree of wildlife species diversity and habitat mix
- Tracts of critical, declining, or vulnerable habitat types (e.g., palustrine wooded wetlands and non-tidal wetlands)
- Tidal wetlands and uplands immediately adjacent
- Threatened or endangered species habitat, including habitat for the recently delisted bald eagle
- Tracts that would connect existing conservation holdings and open areas, as shown in the Rappahannock River Natural and Cultural Atlas compiled by the Chesapeake Bay Foundation and Rappahannock River Valley Association
- Corridors along tributary streams to protect fisheries, safeguard water quality, and provide opportunities for wildlife-oriented recreation for the public

We re-examined those criteria in the light of current conditions, our progress, and our experience since we first proposed to establish the refuge. We found that the original criteria remain valid, and we will continue to use them to prioritize our acquisitions. We also added two new criteria.

- Lands adjoining existing refuge tracts, to create larger blocks of protected habitat
- Large, contiguous, forested blocks (>250 acres), particularly those incorporating headwaters and drainages

In reviewing our criteria, we noticed that the narrative of our final EA (1995) lists Farnham Creek as part of Natural Resource Concentration Area D, but the set of four maps did not depict it. We corrected that oversight by including Farnham Creek, Conley Swamp, and Laton Swamp in the Farnham Creek focus area on map 4.7. We also show on map 4.7 the original natural resource concentration areas (A, B, C, and D) and their respective focus areas.

Please note that the refuge conservation easement program targets lands that contain natural resources whose importance merits their inclusion in the Refuge System, and are not simply open space easements. The goal of our easement program is to protect existing natural resources and work with the landowners to enhance those resources, including water quality buffers, while promoting the continuation of traditional uses of the land.

When we first envisioned the refuge, its proponents acknowledged that no one entity alone could achieve the desired level of land conservation. The refuge

[illegible]

was conceived under the premise that a diverse array of partners, including landowners, non-profit conservation organizations, and government agencies, would all contribute to the same goal.

In many ways, that vision has become a reality. Private landowners have donated thousands of acres in easements, national and regional land conservation organizations engage and work together, and, with their help, the refuge has achieved more than one-third of its goal of protecting 20,000 acres of land. The refuge gained a new partner in 2006 with the approval of Fort A.P. Hill in the Army Compatible Use Buffer Program.

In December 2006, the Service entered into a memorandum of understanding with the Department of the Army, The Conservation Fund, The Nature Conservancy, the Trust for Public Land and the Virginia Outdoors Foundation. We seek to protect the lands around Fort A.P. Hill permanently for their important natural and ecological features, and to maintain the ability of the fort to continue its vital function of military training.

The conservation organizations listed above are long-standing refuge partners who have engaged in helping to conserve lands along the Rappahannock River for more than 10 years. More recently, local organizations such as the Northern Neck Land Conservancy, Middle Peninsula Land Trust, and Essex County Countryside Alliance have organized to reach out to landowners in the hope of fostering additional conservation measures, especially encouraging donations of conservation easements. There are also opportunities to strengthen our relationships with state agencies interested in land protection such as VDGIF and the VA Coastal Zone Management Program and VA DCR. Our land conservation program seeks to complement those of our national, regional, state and local partners.

To continue our progress toward our shared objectives in protecting land, we will employ the following, ongoing strategies.

- 1) Work with partners to identify willing sellers in areas of concentrations of priority natural resources.
- 2) Use our criteria for prioritizing land protection for lands that become available for purchase.
- 3) Continue to coordinate regular meetings of land protection partners to facilitate communication and cooperation.
- 4) Continue to seek opportunities to expand our land protection partnership.
- 5) Seek opportunities for alternative funding sources, such as grants.
- 6) Provide information to elected officials on land protection issues upon request.
- 7) Work with partners and landowners to encourage land conservation outside the refuge boundary.
- 8) Keep communities around the refuge informed about land protection issues through the distribution of outreach material and personal appearances by staff.

Managing Invasive Species

The permanent protection of land is the keystone of wildlife and habitat conservation. Land brought into the Refuge System will be available forever to support fish, wildlife and plants. We can restore, enhance, or maintain the land we purchase in fee title to provide optimal conditions for priority species targeted for conservation, such as threatened or endangered species and those whose populations

are in decline. The land we protect through conservation easements will never convert to uses that would remove permanently their value for fish and wildlife.

The establishment and spread of invasive species, particularly invasive plants, is a significant problem that reaches across all habitat types. For the purposes of this discussion, we use the definition of invasive species contained in the Service Manual (620 FW 1.4E): “Invasive species are alien species whose introduction does or is likely to cause economic or environmental harm, or harm to human health. Alien species, or non-indigenous species, are species that are not native to a particular ecosystem. We are prohibited by Executive Order, law, and policy from authorizing, funding, or carrying out actions that are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere.”

In this section we discuss only alien or non-native species. In some instances, native species whose presence in a particular area interferes with our management objectives are undesirable from a management standpoint and we address their management in a later section of this chapter.

The unchecked spread of invasive plants threatens the biological diversity, integrity and environmental health of all refuge habitats. In many cases, they have a competitive advantage over native plants and form dominant cover types, reducing the availability of native plants as food and cover for wildlife. Over the past several decades, government agencies, conservation organizations, and the public have become more acutely aware of the negative effects of invasive species. Many plans, strategies, and initiatives target the more effective management of invasive species, including “The National Strategy for Management of Invasive Species for the National Wildlife Refuge System” (2003), “Silent Invasion—A Call to Action,” by the National Wildlife Refuge Association (2002), and “Plant Invaders of Mid-Atlantic Natural Areas,” by the Service and the National Park Service (2002). The Refuge System biological discussion database and relevant workshops continually provide new information and updates on recent advances in control techniques. More sources of funding are available, both in the Service budget and through competitive grants, to conduct inventory and control programs.

We have initiated control on the following invasive plants: autumn olive, bamboo, black locust (native to Virginia but not the coastal plain), bull and Canada thistle, common reed or *Phragmites*, English ivy, Japanese knotweed, Japanese stiltgrass, Johnsongrass, kudzu, lespedeza, mile-a-minute weed, multiflora rose, and tree-of-heaven. We have identified others for which we have insufficient resources to initiate control, including Japanese honeysuckle. We will also monitor refuge and adjacent lands and waters for the presence of invasive animal species, such as mute swans and nutria, and be prepared to respond quickly to control them if discovered.

Guidance on managing invasive species on refuges appears in the Service Manual (620 FW 1.7G). The following actions, define our general strategies on the refuge.

- 1) Manage invasive species to improve or stabilize biotic communities to minimize unacceptable change to ecosystem structure and function and to prevent new and expanded infestations of invasive species.
- 2) Conduct refuge habitat management to prevent, control, or eradicate invasive species using techniques described through an integrated pest management plan, or other similar management plan, the plans comprehensively evaluate all potential integrated management options, including defining threshold/risk levels that will initiate the implementation of proposed management actions.
- 3) Evaluate native habitat management activities with respect to their potential to accidentally introduce or increase the spread of invasive species and modify our habitat management operations to prevent increasing invasive species populations.

- 4) Address the abilities and limitations of potential techniques including chemical, biological, mechanical, and cultural techniques when developing IPM plans. See additional discussion on IPM below.
- 5) Manage invasive species on refuges under the guidance of the National Strategy for Invasive Species Management and within the context of applicable policy.

The following actions define our specific strategies for the refuge.

- 1) Continue the treatment of the most problematic species as funding and staffing permit.
- 2) Maintain early-detection/early-response readiness regarding new invasions.
- 3) Remove the parent sources of highly invasive species (e.g., species that are high seed producers or vigorous rhizome producers) from along the edges of management units.
- 4) Maintain accessibility to affected areas for control and monitoring.
- 5) Continue to promote research into the biological control of common reed.
- 6) Continue and increase efforts to involve the community in promoting awareness of invasive species issues, and seek assistance for control programs on and off the refuge.

Integrated Pest Management (IPM)

In accordance with 517 DM 1 and 7 RM 14, an integrated pest management (IPM) approach will be utilized, where practicable, to eradicate, control, or contain pest and invasive species (herein collectively referred to as pests) on the refuge. IPM involves using methods based upon effectiveness, cost, and minimal ecological disruption, which considers minimum potential effects to non-target organisms and the refuge environment. Pesticides may be used where physical, cultural, and biological methods or combinations thereof, are impractical or incapable of providing adequate control, eradication, or containment. Furthermore, pesticides would be used primarily to supplement, rather than as a substitute for, practical and effective control measures of other types. If a pesticide would be needed on the refuge, the most specific (selective) chemical available for the target species would be used unless considerations of persistence or other environmental and/or biotic hazards would preclude it. In accordance with 517 DM 1, pesticide usage would be further restricted because only pesticides registered with the US Environmental

Protection Agency (USEPA) in full compliance with the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and as provided in regulations, orders, or permits issued by USEPA may be applied on lands and waters under refuge jurisdiction.

Environmental harm by pest species would refer to a biologically

Treating Phragmites, an invasive plant



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substantial decrease in environmental quality as indicated by a variety of potential factors including declines of native species' populations or communities, degraded habitat quality or long-term habitat loss, and/or altered ecological processes. Environmental harm may be a result of direct effects of pests on native species including preying and feeding on them; causing or vectoring diseases; preventing them from reproducing or killing their young; out-competing them for food, nutrients, light, nest sites or other vital resources; or hybridizing with them so frequently that within a few generations, few if any truly native individuals remain. In contrast, environmental harm can be the result of an indirect effect of pest species. For example, decreased waterfowl use may result from invasive plant infestations reducing the availability and/or abundance of native wetland plants that provide forage during the winter.

Environmental harm may also include detrimental changes in ecological processes. For example, invasions by tree of heaven can displace grasslands planted in native species, or Japanese stiltgrass can inhibit the recruitment of native tree species in forests. Environmental harm may also cause or be associated with economic losses and damage to human, plant, and animal health. For example, invasions by stand-replacing invasive species that alter entire plant and animal communities by eliminating or sharply reducing populations of native plant and animal species can also greatly increase control efforts and costs. They may also act as sources for invasion onto private property, a particular concern in this agricultural-based community.

We will refine our control program to address the most critical problems first. We may adjust our priorities to reflect regional Service priorities, the availability of new information, or a new resource.

Monitoring and Abating Wildlife and Plant Diseases

The Service has not yet published its manual chapter on Disease Prevention and Control. In the meantime, we derive guidance on this topic from the Refuge Manual and specific directives from the Director of the Fish and Wildlife Service or the Secretary of the Interior. The Refuge Manual (7 RM 17.3) lists three objectives for the prevention and control of disease.

- 1) Manage wildlife populations and habitats to minimize the likelihood of the contraction and contagion of disease.
- 2) Provide for the early detection and identification of disease mortality when it occurs.
- 3) Minimize the losses of wildlife from outbreaks of disease.

The Service published those objectives in 1982. Since then, in addition to diseases that cause serious mortality among wildlife, diseases transmitted through wildlife to humans have received more attention. One example is Lyme disease. In 2002, the Service published a Service Manual chapter (242 FW 5) on Lyme Disease Prevention to inform employees, volunteers, and national service workers about this disease, its prevention, and treatment.

Another serious wildlife disease that receives considerable attention worldwide is avian influenza. Of particular concern is the highly pathogenic Eurasian form (H5N1). In 2006, the Service instructed all refuges to prepare an Avian Influenza Surveillance and Contingency Plan. The plan covering all four refuges in the Eastern Virginia Rivers Refuge Complex, approved in December 2006, discusses methods for dealing with this disease.

In Virginia, chronic wasting disease (CWD) is also a concern. That disease, a progressive one of the brain and nervous system, infects deer and elk and,

ultimately, causes the death of the infected animals. As of 2006, the disease had not appeared in Virginia, but had appeared in Hampshire County, West Virginia. A ban on carcass importation is in effect in Virginia. It is unlawful for any person to distribute food, minerals, carrion, or similar substances to feed or attract deer from September 1 through the first Saturday in January. The CWD management plan for the refuge complex was approved in 2008.

In addition to the diseases of wildlife, we are attentive to the diseases that affect forest health. Human activities that dramatically alter the landscape, such as development and sprawl, forest fragmentation, new road and utility construction, agriculture, introduction of non-native invasive species, and transport of disease-bearing hosts through the landscaping trade, can weaken and degrade the quality of habitats, particularly of trees and forests. Because we value highly the oak hardwood forests on the refuge, diseases that affect oaks are a special concern.

More than 80 documented insects and diseases affect oak trees in the United States. The escalating international trade is likely to introduce new pests. Their impacts range from minor defoliation to rapid mortality. In some years, pests cause the loss of a major portion of the acorn crop, impeding oak regeneration. A few pests have altered or may alter eastern U.S. oak forests on a broad scale. For example, humans' inadvertently transporting masses of eggs have aided the spread of the gypsy moth, an introduced defoliator, in the last few decades.

These are the general strategies for preventing or controlling disease.

- 1) Continue to conduct disease surveillance in conjunction with other fieldwork.
- 2) Cooperate with state agencies, particularly the Virginia Department of Game and Inland Fisheries or Virginia Department of Forestry, in conducting surveillance, providing access for sampling, and following protocols in the event of an outbreak.
- 3) Inform volunteers and others who work in the field about the dangers of Lyme disease and measures to avoid contracting it.
- 4) Monitor forests and other habitats for indicators of the increased occurrence of pests or disease. For example, note changes in flowering or fruiting phenology, physical damage, decay, weakening, sudden death, particularly of canopy and source trees of major host species, and changes in wildlife use of habitats, such as the absence of breeding birds that used to appear regularly.
- 5) Follow the protocols in national, state, and refuge disease prevention and control plans.

Controlling Pest Plants and Animals

At times, native plants and animals interfere with management objectives. The Refuge Manual (7 RM 14.4A) defines a pest as "Any terrestrial or aquatic plant or animal which interferes, or threatens to interfere, at an unacceptable level, with the attainment of refuge objectives or which poses a threat to human health." That definition could include the invasive species defined above, but in this section, we describe some situations involving native species and under what conditions we will initiate control.

In controlling pests, whether invasive or native species, we use an integrated approach. The Refuge Manual (7 RM 14.4C) defines integrated pest management as "A dynamic approach to pest management which utilizes a full knowledge of a pest problem through an understanding of the ecology of the pest and ecologically related organisms and through continuous monitoring of their populations. Once an acceptable level of pest damage is determined, control programs are carefully

designed using a combination of compatible techniques to limit damage to that level.”

An integrated approach uses various methods, including natural, biological, cultural, mechanical, and chemical controls. Some examples and potential remedies of pest management follow.

Problem: Deer browsing on newly planted tree seedlings, causing unacceptable levels of mortality

Potential solutions: Use tree shelters around newly planted seedlings or plant clover in advance of tree planting to provide alternative food source. Use public hunting to keep deer populations in balance.

Problem: Beaver girdling large trees adjacent to public use facilities, potentially causing injury to visitors or damaging facilities from falling trees and branches

Potential solutions: Wrap trees with hardware cloth to prevent girdling. Temporarily employ local trappers to remove individuals from the population from selected locations. Remove dead trees before they fall. Also, see discussion below about furbearers and the discussion on general strategies.

Problem: Mute swans using and increasing in protected wetland areas.

Potential solution: Work with state partners (VDGIF) on the capture and removal of mute swans. The Service goal is zero productivity for mute swan in the Northeast Region, due to that swan’s negative impact on native waterfowl and their habitats.

Problem: Undesirable invasive or pest tree species establishing themselves in areas managed as grasslands, especially along the edges of fields, causing an unacceptable change in structure or composition of the grassland.

Potential solutions: Remove seed source by cutting high seed-producing trees along the edges of the fields. Use mowing or prescribed fire to kill saplings. Combine mowing and herbicide for long-term control.

Problem: Furbearers such as raccoons are causing unacceptable levels of predation on nesting birds.

Potential solutions: We do not intend to initiate a public trapping program at this time. The Service considers trapping as a commercial activity, and therefore it must meet a higher standard of compatibility than priority public recreational uses, or other non-commercial refuge uses. However, we may employ state-licensed volunteer or commercial trappers on a case-by-case basis to help alleviate a particular problem. In this case, trapping is considered a management activity and is not subject to compatibility standards. We will also consider non-lethal methods such as constructing predator guards, or mechanically removing any structural vegetation that provides access to nests by predators. Promoting large, unfragmented tracts of forest or habitat also reduces access to predators.

We use the following general strategies in pest management.

- 1) Determine the need for site-specific control based on the potential to affect our management objectives for a given area. We will employ an adaptive management strategy and we expect lethal control or removal of individual animals to be the exception rather than the rule. To establish general thresholds for lethal control is difficult. So we will determine our solution on a case-by-case basis. For example, in some areas, beaver activity (e.g., ponding, flooding, tree-girdling, tree-falling, etc.) enhances our management objectives for wildlife and habitats. In other areas, extensive beaver activity (e.g., tree-falling, trees dying from flooding), could begin to affect habitat significantly for migratory birds and other sensitive species. We would base our action on

the extent and impact of beaver damage: how it affects sensitive resources, neighboring marshes and fields, refuge infrastructure, and accessibility. When non-lethal techniques are not feasible, or they are no longer a viable remedy, we will consider targeted trapping.

- 2) Employ integrated pest management techniques, including those described in the examples above, when a species is having a significant impact on an area resulting in major habitat replacement and loss of valuable canopy trees (such as oaks).
- 3) Monitor results to ensure that pests do not exceed acceptable levels.

Biological and Ecological Research and Investigations

The Refuge Manual and the Service Manual both contain guidance on conducting and facilitating biological and ecological research and investigations on refuges. In 1982, the Service published three objectives in the Refuge Manual for supporting research on units of the Refuge System (4 RM 6.2):

- 1) to promote new information and improve the basis for, and quality of, refuge and other Service management decisions;
- 2) to expand the body of scientific knowledge about fish and wildlife, their habitats, the use of these resources, appropriate resource management, and the environment in general; and,
- 3) to provide the opportunity for students and others to learn the principles of field research.

In 2006, the Service Manual provided supplemental guidance on the appropriateness of research on refuges: “We actively encourage cooperative natural and cultural research activities that address our management needs. We also encourage research related to the management of priority general public uses. Such research activities are generally appropriate. However, we must review all research activities to decide if they are appropriate or not as defined in section 1.11. Research that directly benefits refuge management has priority over other research.” (603 FW 1.10D(4))

All research conducted on the refuge must be consistent with the approved finding of appropriateness and compatibility determination for research. Research projects will also contribute to a need identified by the refuge or the Service. As we note in chapter 3, we have allowed many research projects that meet these criteria. A special use permit will be issued for all research projects we allow. In addition, we will employ the following general strategies.

- 1) Seek qualified researchers and funding to help answer refuge-specific management questions.
- 2) Participate in appropriate multi-refuge studies conducted in partnership with the U.S. Geological Survey.
- 3) Facilitate appropriate and compatible research by providing temporary housing and equipment, if available, for persons conducting fieldwork.



USFWS

Youth fishing day

Protecting Cultural Resources

As a Federal land management agency, we are responsible for locating and protecting all historic resources: specifically, archeological sites and historic

structures eligible for listing or listed on the National Register of Historic Places. That applies not only to refuge land, but also to land affected by refuge activities, and includes any museum properties. Our consultation with the Virginia State Historic Preservation Officer (VA SHPO) indicates 36 archeological sites have been recorded on refuge land. Considering the topography of the area and its proximity to watercourses, additional prehistoric or historic sites likely may be located in the future. We expect their density on the refuge to be high. The archeological remains of prehistoric camps sites or villages most likely will be located along the streams, where early inhabitants would have had ample water, shelter, and good opportunities for fishing and hunting.

We will continue to evaluate the potential for our management activities to impact archeological and historical resources as required, and will consult with the VA SHPO. We will be especially thorough in areas along the river, where the probability of locating a site is higher. We will ensure compliance with Section 106 of the National Historic Preservation Act. That compliance may require any or all of the following: a State Historic Preservation Records survey, literature survey, or field survey.

We will also continue to maintain, to the standards of Federal historic preservation, the two structures eligible for inclusion on the National Register of Historic Places: the Wilna plantation house and the detached kitchen. The substantial repair of the exterior fabric on the plantation house recently was completed, and we will continue with plans to repair its interior, as well as the detached kitchen house.

Wildlife-Dependent Recreational Program

The National Wildlife Refuge System Improvement Act of 1997 designated six priority public uses on National Wildlife Refuges: hunting, fishing, wildlife observation, photography, environmental education, and interpretation. Per the General Guidelines for Wildlife-Dependent Recreation, Fish and Wildlife Service Manual, 605 FW 1, we will strive to meet the following criteria for a quality wildlife-dependent recreation program:

- 1) promotes safety of participants, other visitors, and facilities;
- 2) promotes compliance with applicable laws and regulations and responsible behavior;
- 3) minimizes or eliminates conflict with fish and wildlife population or habitat goals or objectives in an approved plan;
- 4) minimizes or eliminates conflicts with other compatible wildlife-dependent recreation;
- 5) minimizes conflicts with neighboring landowners;
- 6) promotes accessibility and availability to a broad spectrum of the American people;
- 7) promotes resource stewardship and conservation;
- 8) promotes public understanding and increases public appreciation of America's natural resources and our role in managing and conserving these resources;
- 9) provides reliable/reasonable opportunities to experience wildlife;
- 10) uses facilities that are accessible to people and blend into the natural setting; and,
- 11) uses visitor satisfaction to help to define and evaluate programs.

A community survey we conducted with assistance from USGS in 2006 indicates that all six priority uses of the Refuge System are desirable by at least 25 percent of the respondents, with stronger preferences for some activities more so than others. For example, fishing was rated as a highly desirable activity by 75 percent of those who responded to our survey. All of the priority public uses will continue to be offered to some degree on this refuge.

In recent years, the Service has recognized the importance of connecting children with nature. Scholars and health care professionals are suggesting a link between a loss of connection with the natural world and many physical and mental maladies in our nation's youth (Louv 2005). We will continue to promote the concept of connecting children with nature in all of our compatible recreational programming. Our partners, Friends, and/or other volunteers will continue to help us expand those and other priority public use programs. We will also continue to coordinate with the VDGIF on hunting and fishing programs, as well as efforts to promote the Virginia Birding and Wildlife Trail.

Appropriateness and Compatibility Determinations

Chapter 1 describes the requirements for determinations of appropriateness and compatibility. Appendix B includes all approved findings of appropriateness and compatibility determinations consistent with implementing this plan. Activities were evaluated based on whether or not they contribute to meeting or facilitating refuge purposes, goals, and objectives. As noted above, hunting, fishing, wildlife observation and photography, and environmental education and interpretation, when compatible, are the priority general wildlife-dependent uses of the Refuge System. According to Service Manual 605 FW 1, those uses should receive preferential consideration in refuge planning and management before the refuge manager analyzes other recreational opportunities for appropriateness and compatibility.



Cat Point Creek

USFWS

Activities Not Allowed

We have received requests for non-priority, non-wildlife-dependent activities that have never allowed on the refuge. In appendix B, we formally determine that the following are not appropriate on refuge lands: use of all-terrain vehicles, bicycling off-road, camping, dog training and field trials, pets, horseback riding, jogging off-road, picnicking, the use of pursuit dogs for hunting, and swimming and sunbathing. Appendix B documents the refuge manager's justification for why they are deemed not appropriate. Other ownerships nearby or elsewhere sufficiently provide most of those activities, so the lack of refuge access does not eliminate opportunities for those activities in the Rappahannock River Valley. According to Service policy, (603 FW 1), if the refuge manager determines a use is not appropriate, it can be denied without determining its compatibility.

Activities Allowed

Some activities were previously approved through an existing finding of appropriateness and a compatibility determination. These include deer hunting, research, and cooperative farming. Those approvals are included in appendix B. In addition, we are formally allowing other several other activities including: wildlife observation, photography, environmental education and interpretation, recreational fishing, hunting dog retrieval, and firewood cutting. The latter two activities have an approved finding of appropriateness, but their respective

Refuge Staffing and Administration

compatibility determinations are included as part of this CCP. Appendix B details our decisions for all of those activities.

This document does not constitute a commitment for staffing increases, or funding for operations, maintenance, or future land acquisition. Congress determines our annual budgets, which our Washington headquarters and regional offices distribute to the field stations. Chapter 3 presents our levels of staffing and operating and maintenance funds for the refuge over the last 5 years. The activities we describe below pertain to staffing, administration, and operations. Implementing them supports all our refuge goals.

Permanent Staffing and Operational Budgets

Our objective is to sustain levels of annual funding and staffing that allow us to achieve refuge purposes, as interpreted by the goals, objectives, and strategies in this CCP. We achieved many of our most highly visible projects since refuge establishment through special project funds that typically have a 1- to 2-year duration. Although those funds are very important, their flexibility is limited, because we cannot use them for any other priority project that may arise. As previously mentioned, funding for land acquisition derives primarily from two sources: the Land and Water Conservation Fund, and the Migratory Bird Conservation Fund. We generally direct the funds from those sources at specific acquisitions.

In response to declines in operational funding nationwide, the “Strategic Workforce Plan for the National Wildlife Refuge System in Region 5” (Phase 2; January 16, 2007) was developed to support a new base budget approach. Its goal is a maximum of 75 percent of a refuge station budget to cover salaries and fixed costs, while the remaining 25 percent or more will be operating and maintenance funds. The plan’s strategy is to improve the capability of each refuge manager to do the project work of the highest priority, and not to have most of a refuge budget tied up in inflexible, fixed costs. Unfortunately, in a level or declining budget environment, that also may have implications for the level of permanent staffing.

We will seek, within the guidelines of the base budget approach, to fill our currently approved but vacant positions, which we believe are necessary to accomplish our highest priority projects. We have also proposed additional staff to provide depth in our biological and visitor services programs. We identify our recommended priority order for new staffing in the RONS tables in appendix D. We also seek to increase our maintenance staff because they provide invaluable support to all program areas.

Refuge Operating Hours

We will open the refuge for public use from official sunrise to sunset, seven days a week, to insure visitor safety and protect refuge resources. However, the refuge manager does have the authority to issue a special use permit to allow others access outside those periods. For example, we may permit access for research personnel or hunters at different times, or organized groups to conduct nocturnal activities, such as wildlife observation, and educational and interpretive programs.

Facilities Construction and Maintenance

We acquired the first parcel of land for the refuge in 1996, but it was not until 2000 that we began to direct significant funding toward the construction, rehabilitation, or maintenance of refuge facilities. Since 2000, we have made notable progress in rehabilitating old buildings for use as the refuge headquarters, for equipment storage and as a maintenance/shop area, constructing new visitor services facilities, and improving access and security. We have also removed nearly 20 old buildings that were no longer functional or that posed safety hazards. In 2007, we replaced two old houses with modular homes for use as refuge staff quarters and other

refuge uses, and began rehabilitation of a third house. We began construction on a public roads improvement project in 2009.

We will continue to make incremental progress in constructing new, modest, high-quality visitor services facilities such as interpretive and informational signs and small pavilions. We discuss plans for a new refuge headquarters below.

Prior to and during construction, we will adhere to all applicable permits, rules, and regulations required for national wildlife refuges. Protection of air quality, water quality, soils, vegetation, wildlife, and cultural resources will be of paramount consideration in our siting, design, and construction. We will conduct a solid and hazardous waste investigation to identify any issues before major construction. Our siting and design will also consider the long-term use and opportunities for using recycled materials and composting. We will also minimize fugitive dust caused during construction activities utilizing the following measures:

- Use, where possible, of water or chemicals for dust control.
- Installation and use of hoods, fans, and fabric filters to enclose and vent the handling of dusty materials.
- Cover open equipment for conveying materials.
- Remove promptly spilled or tracked dirt or other materials from paved streets and remove dried sediments resulting from soil erosion.

We will also undertake measures for protecting water resources during construction and maintenance including the following:

- Landscape with hardy native plant species to conserve water as well as minimize the need to use fertilizers and pesticides.
- Convert turf to low water-use landscaping such as drought resistant grass, plants, shrubs and trees.
- Install low-flow toilets in new facilities.
- Install low-flow restrictors/aerators in faucets.
- Improve irrigation practices by upgrading with a sprinkler clock; watering at night, if possible, to reduce evapotranspiration, and install a rain shutoff device.
- Collect rainwater with a rain bucket or cistern system with drip lines.
- Replace old equipment with new high-efficiency machines to reduce water usage by 30-50 percent per use.
- Check for and repair leaks (toilets and faucets) during routine maintenance activities.
- Design stormwater controls to replicate and maintain the hydrographic condition of the site prior to the change in landscape. This should include, but not be limited to: utilizing bioretention areas; and minimizing the use of curb and gutter in favor of grassed swales. Bioretention areas (also called rain gardens) and grass swales are components of low impact development. They are designed to capture stormwater runoff as close to the source as possible and allow it to slowly infiltrate into the surrounding soil. They benefit natural resources by filtering pollutants and decreasing downstream runoff volumes.

- Design and construct new trails, using permeable trail surfaces that allow the infiltration of groundwater into the soil.

We will protect soils and wetlands during all construction and maintenance activities following the measures outlined below:

- Operate machinery and construction vehicles outside of stream-beds and wetlands; use synthetic mats when in-stream work is unavoidable.
- Preserve the top 12 inches of material removed from wetlands for use as wetland seed and root-stock in the excavated area.
- Place heavy equipment, located in temporarily impacted wetland areas, on mats, geotextile fabric, or use other suitable measures to minimize soil disturbance, to the maximum extent practicable.
- Restore all temporarily disturbed wetland areas to pre-construction conditions and plant or seed with appropriate wetlands vegetation in accordance with the cover type (emergent, scrub-shrub or forested). The applicant should take all appropriate measures to promote re-vegetation of these areas. Stabilization and restoration efforts should occur immediately after the temporary disturbance of each wetland area instead of waiting until the entire project has been completed.
- Place all materials which are temporarily stockpiled in wetlands, designated for use for the immediate stabilization of wetlands, on mats or geotextile fabric in order to prevent entry in state waters. These materials should be managed in a manner that prevents leachates from entering state waters and must be entirely removed within thirty days following completion of that construction activity. The disturbed areas should be returned to their original contours, stabilized within thirty days following removal of the stockpile, and restored to the original vegetated state.
- Flag or mark all non-impacted surface waters within the project or right-of-way limits that are within 50 feet of any clearing, grading or filling activities for the life of the construction activity within that area. The project proponent should notify all contractors that these marked areas are surface waters where no activities are to occur.
- Employ measures to prevent spills of fuels or lubricants into state waters.
- Maintain undisturbed wooded buffers of at least 100 feet in width around all onsite wetlands and on both sides of all perennial and intermittent streams.
- Adhere to erosion and sediment control, and stormwater management practices.
- Establish (prior to implementation of the project) and maintain erosion and sediment control and best management practices (BMPs) during all construction/burning activities until bare soils are stabilized and vegetated to reduce the amount of surface water runoff entering the adjacent surface waters, including wetlands.
- Follow the specifications stated in the Virginia Department of Conservation and Recreation (DCR) Erosion and Sediment Control Handbook (1992, 3rd edition).

We will also continue to make progress toward improving access and visibility for visitors. We have identified the need for additional directional signs both on and off site. We will work with the Virginia Department of Transportation to improve directional signage off-site.

Improved signage will help raise the visibility of the refuge and the Service in the region, which, as we learned from our 2006 community survey, is an important action to pursue. We will also continue to identify and remove those structures that have no useful purpose or that pose safety hazards. If appropriate, and to advance refuge objectives, we will seek funding to replace dilapidated structures with modern facilities. We must also take care to maintain both new and rehabilitated facilities to Service standards to keep them safe, fully accessible, functional, and attractive.

New Headquarters and Visitor Facility

The construction of a new headquarters and visitor contact facility is a high priority. The present headquarters is located in the Wilna House, an early to mid-19th century farmhouse, which has been determined eligible for inclusion on the National Register of Historic Places. Over the past 175 years, parts of the house have been upgraded and modernized, but it retains much of its original construction material and charm. However, it was never intended to serve as government office space, and it does not serve that function well, particularly in terms of accessibility, accommodation of space for both visitors and staff, and utilities.

In December 2006, we evaluated potential sites for a new headquarters and visitor welcome center. The evaluation team was comprised of members from the Core Planning Team (G. Hall [VDGIF], J. Study [FWS], and S. Lingenfelter [FWS]) and refuge staff (refuge manager, deputy manager, and maintenance worker). We evaluated four refuge tracts, all owned in fee title: the Hutchinson, Tayloe, Wellford, and Wilna tracts (see map 1.1 for their locations). In that evaluation, we used the following criteria (shown in alphabetical order).

- 1) accessibility to major road(s) (to increase public visibility, provide easier access to the visiting public, and provide easier access for staff to reach other destinations)
- 2) aesthetics
- 3) archeological concerns
- 4) availability of on-site recreation/interpretation opportunities
- 5) distance to other refuge properties, especially those requiring management
- 6) distance to local infrastructure (e.g., police, fire, business, other government agencies)
- 7) existing support facilities and space to construct new storage and maintenance facilities
- 8) existing utilities in place
- 9) long-term maintenance, for example, a long entrance road, trees that might blow down along a road, or potential for flooding
- 10) potential for the disturbance of surrounding habitats/wildlife
- 11) potential for the disturbance of adjoining or nearby landowners
- 12) suitability of soils for new buildings
- 13) other (any other criterion, including the potential for using “green” infrastructure)



Gray Fox

We rated the potential sites issuing points according to the criteria above. The ratings we applied were +2 points (excellent), +1 points (good), 0 (neutral), -1 points (poor), or -2 points (very poor). After we averaged the numerical rankings, the Hutchinson tract (13.4 points total) was the preferred location, followed by the Tayloe (10.0 points), Wellford (9.6 points) and Wilna (3.8 points) tracts.

This CCP adopts the Hutchinson tract as the location for the new headquarters and visitor welcome center; however, we are unsure when funding could be made available. If, in the interim, new significant information or opportunities become available, we would conduct another evaluation as warranted and/or we would ensure that the criteria and rankings we used in 2006 remain valid and complete. Until the funding for construction becomes available, or we acquire a more suitable building site, we will continue to use the Wilna House as our headquarters and primary office space.

The Service has developed standard designs for new refuge headquarters and visitor welcome centers. Given our projected staffing and visitation numbers, we would likely receive the smallest of the three standard designs. That design, approximately 6,845 sq ft at an estimated cost of \$4 million, accommodates a staff of 10 or fewer and visitation of 70,000 or fewer. However, in 2006, our Regional Director instructed all Service offices in the Northeast Region to evaluate the potential for co-locating offices, to reduce the current number of offices located in rented space, provide more efficient customer service, and enhance intra-Service cooperation and collaboration. The Regional Director also encouraged co-locating with state fish and wildlife and other natural resource agencies. Depending on the outcome of the evaluation of offices in eastern and central Virginia, we may require substantially larger office space to accommodate staff from other Service divisions or state agencies.

Conducting a Wilderness Review

The Refuge System planning policy requires that we conduct a wilderness review during the CCP process. The first step is to inventory all refuge lands and waters the Service owns in fee simple. Our inventory of this refuge determined that no areas meet the eligibility criteria for a wilderness study area as defined by the Wilderness Act. Therefore, we did not analyze further the refuge's suitability for wilderness designation. See appendix E in the draft CCP/EA for the results of the wilderness inventory. The refuge will undergo another wilderness review in 15 years as part of the next comprehensive conservation planning process.

Conducting a Wild and Scenic Rivers Review

Service planning policy also requires that we conduct a wild and scenic rivers review during the CCP process. We inventoried the segment of the Rappahannock River that flows through the refuge, and determined that it meets the criteria for wild and scenic river eligibility, in that it is free flowing and possesses at least one "Outstanding Remarkable Value" (see appendix F in the draft CCP/EA). However, we are neither pursuing further study to determine suitability, nor recommending this segment of the river at this time, because of the multitude of ownerships within the boundary of the analysis area and our limited ownership. Should another state or Federal agency or a non-governmental partner initiate a study, we would participate in that effort.

Monitoring and Enforcing Farmers Home Administration Easements

From the late 1980s to the mid-1990s, the Farmers Home Administration (FmHA) acquired many properties in central and southwest Virginia through foreclosure sales. Under the terms of a memorandum of understanding between the FmHA and the Service, a review team consisting of their staff, our staff, and staff from the USDA Natural Resources Conservation Service and the Agricultural Stabilization and Conservation Service evaluated those properties for their conservation value. Based on those evaluations, and before reselling those properties, the

FmHA placed permanent conservation easements on some of them to protect wetlands and other important wildlife habitats. The responsibility for enforcing and monitoring those easements rests with the Service, which delegated it to the manager of the closest refuge: in many cases, the Presquile refuge.

Because we now manage the Presquile refuge as a satellite of the refuge complex, the responsibility for managing eight of those easements rests now with the project leader stationed at the Rappahannock River Valley refuge. On three occasions since 2001, the project leader has acted to enforce the terms of those easements. The time required in each instance averaged about 2 to 3 workdays.

It is difficult to predict how much time and effort this responsibility will require in the future. However, the responsibility will remain with the project leader stationed at Rappahannock River Valley Refuge for now. If we were to begin sustained and systematic monitoring of those easements, rather than only the current opportunistic enforcement, the time commitment would be substantially greater than it has been to date. We do not anticipate having the staff available to monitor on a regular basis, but it is possible and desirable to begin a modest monitoring program so that we visit each easement at least once every 5 years.

We will employ the following strategies to discharge our responsibilities in managing FmHA easements.

- 1) Respond to reports of violations or possible violations, as we learn of them. Work with landowners, utilizing partnerships where possible, to cooperatively resolve and remedy the violations. If necessary, work with the Regional Solicitor or Assistant US Attorney's Office to ensure remediation and future compliance.
- 2) Develop a process to begin regular inventory and monitoring of FmHA easements to visit each easement once every 5 years. Work with partners and other Service offices to assist when possible.

Cooperative Farming

We will continue to use cooperative farming on an interim basis, while we work to convert former and current agricultural lands into native habitats in support of the Service policy on Biological Integrity, Diversity and Environmental Health (601 FW 3). The final environmental assessment to establish the refuge provides for the use of cooperative farming as a viable resource management opportunity in the management of the refuge. The use of cooperative farming as an interim measure will keep fields open in preparation for conversion to native plants, and will help us properly establish newly converted early successional habitats. It has been an integral component of refuge habitat restoration and management.

As of 2007, the program included 210 acres on the Tayloe tract. In lieu of paying rent for the use of refuge farm fields, the cooperator supports the accomplishment of our habitat management objectives by performing farming-related activities (discing, planting, spraying, and mowing) on farm fields as they come out of agricultural production, in support of our annual habitat management program and activities. The program will adhere to the general conditions for cooperative farming programs listed in the Refuge Manual (6 RM 4 exhibit 1). All operations on refuge cropland must conform to the best farming and soil conservation practices.

Although the cooperative farming program will stay important in our habitat program over the next few years, we plan to phase it out by 2012 (refer to appendix B, compatibility determination for cooperative farming). During that phase-out period, we will continue to evaluate the role of cooperative farming as a tool in achieving our long-term management goals. If we determine that it can provide substantial benefits that we would not attain otherwise, we may reverse our decision to phase it out by 2012, and keep some fields in agricultural production. That decision would require a new compatibility determination and public review.

The cooperator must have prior approval of the refuge manager before applying any pesticide. The cooperator also must supply the refuge manager a label containing the common name of the pesticide, its application rate, number, and methods, and target pests at least three months before farming. The cooperator, at the time of application, must complete a pesticide spray record furnished by the refuge. Those records provide the refuge information on trace residues and improve pest control practices.

Another activity we will evaluate over the next 5 years is the possibility of keeping a small area in agriculture to demonstrate and interpret best farming management practices that protect water quality and benefit wildlife habitat. That would promote both sustainable and conservation-oriented farming techniques, and would be included as part of our outreach and interpretation program. We believe it is important to continue to highlight the evolution of professional wildlife management principles, which now suggest that the maintenance of native plant communities offers more benefits overall to wildlife than planting annual food plots. Because that concept is relatively new, the need is compelling to share information and expertise among all interested parties. The Rappahannock River Valley, with its centuries-old traditions of agriculture, offers excellent opportunities for this kind of interpretation.

Cutting Firewood

We have determined that public firewood cutting may occasionally be advantageous to refuge management, especially in the aftermath of large storms. Experience has shown that hurricanes and other large storms often leave many downed trees across refuge roads or in other places where they impede operations and management. By offering opportunities to cut and remove firewood, we save operational funds and provide a service to the community. We may require a small fee, and specify the terms and conditions in a special use permit, depending on the circumstances of each situation. We may offer the same opportunity to refuge staff, under the same conditions and fees as those for the public. The staff privilege requires approval from the Regional Director.

Distributing Refuge Revenue Sharing Payments

As we describe in chapter 3, we pay the following counties in Virginia annual refuge revenue sharing payments based on the acreage and the appraised value of refuge lands in their jurisdiction: Caroline, Essex, King George, Richmond, and Westmoreland. Those annual payments are calculated by formula determined by, and with funds appropriated by, Congress. We will continue those payments, in accordance with the law, commensurate with changes in the appraised market value of refuge lands, or new appropriation levels dictated by Congress. Future acquisitions in other counties, will lead to additional refuge revenue sharing payments.

Completing Refuge Step-down Plans

Service planning policy identifies 25 step-down plans that may be applicable on any given refuge. We have identified the 10 plans below as the most relevant to this planning process, and we have prioritized their completion, if they are not already developed.

The annual habitat work plan (AHWP), an inventory and monitoring plan (IMP), and an integrated pest management Plan (IPM) are also identified as high priority step-down plans to complete. We describe them in more detail below. To keep them relevant, we will modify and update them as we obtain new information. The completion of these plans supports all refuge goals.

- Hunt Plan, completed in 2001
- Fire Management Plan, completed in 2009
- Fishing Management Plan, completed in 2003
- Environmental Education Plan, completed in 2004

- Avian Influenza Plan, completed in 2007
- Hurricane Action Plan, completed in 2008 (updated annually)
- Chronic Wasting Disease Plan, completed in 2008

We will also complete the following step-down management plans:

- HMP, which we will immediately begin working on following CCP approval (see discussion below)
- AHWP, annually after CCP approval (see discussion below)
- Safety Plan, within 1 year of CCP approval.
- IMP, within 2 years of CCP approval (see discussion below)
- Visitor Services Plan (VSP), which would incorporate the previously approved hunt and fishing plans within 3 years of CCP approval, assuming we hire a visitor services professional
- Law Enforcement Plan, within 3 years of CCP approval
- Facilities and Sign Plan, within 3 years of CCP approval
- Integrated Pest Management Plan (IPM), within 2 years of CCP approval (see discussion below)

Habitat Management Plan

A HMP for the refuge is the requisite first step toward achieving the objectives of goals 1–3. For example, the HMP will incorporate our habitat objectives and will identify “what, which, how, and when” actions and strategies we would implement over the 15-year period to achieve those objectives. Specifically, the HMP will define management areas and treatment units, identify the type or method of treatment, establish the timing for management actions, and define how we will measure success over the next 15 years. In this CCP, the goals, objectives, and list of strategies in each objective identify how we intend to manage habitats on the refuge. We base both the CCP and HMP on current resource information, published research, and our own field experiences. We will update our methods, timing, and techniques as new, credible information becomes available. To facilitate our management, we will regularly maintain our GIS database, documenting any major changes in vegetation at least every 5 years.

Annual Habitat Work Plan and Inventory and Monitoring Plan

The AHWP and IMP for the refuge are also priorities for completion upon CCP approval. Those plans also are vital for implementing habitat management actions and measuring our success in meeting the objectives. Each year, we will generate from the HMP an AHWP that will outline specific management activities for that year. The IMP will outline the methodology to assess whether our original assumptions and proposed management actions support our habitat and species objectives. We will prioritize our inventory and monitoring needs in the IMP. The results of inventories and monitoring will provide us with more information on the status of our natural resources and allow us to make more informed management decisions.

Integrated Pest Management Plan

The refuge’s IPM plan will be completed within 2 years of CCP approval. The IPM supplements both the CCP and HMP with documentation on how to manage invasive or pest species. Along with a more detailed discussion of IPM techniques, this documentation describes the selective use of pesticides for pest management

on the refuge, where necessary. Throughout the life of the CCP or HMP, most proposed pesticide uses on the refuge would be evaluated for potential effects to refuge biological resources and environmental quality. These potential effects would be documented in “Chemical Profiles” in the forthcoming IPM document. Pesticide uses with appropriate and practical best management practices (BMPs) for habitat management as well as cropland/facilities maintenance would be approved for use on the refuge where there likely would be only minor, temporary, and localized effects to species and environmental quality based upon non-exceedance of threshold values in chemical profiles. However, pesticides may be used on a refuge where substantial effects to species and the environment are possible (exceed threshold values) in order to protect human health and safety (e.g., mosquito-borne disease).

Additional NEPA Analysis

For all major Federal actions, NEPA requires the site-specific analysis and disclosure of their impacts, either in an environmental assessment (EA) or in an EIS. NEPA categorically excludes other, routine activities from that requirement.

Most of the major actions proposed were fully analyzed in the draft CCP/EA and were described in enough detail to comply with NEPA, and would not require additional environmental analysis. Although this list is not all-inclusive, the following projects fall into that category:

- the HMP, including its uplands and wetlands habitat management programs;
- the IMP;
- new visitor services infrastructure planned, including development of a new headquarters and visitor contact facility;
- controlling invasive plants;
- implementing an administrative furbearer management program; and,
- changing our priority public use programs, with the exception of new hunting proposals.

The current fire management plan, white-tailed deer hunting plan, and public fishing plan have already undergone the NEPA analysis process. Those environmental documents can be requested from refuge headquarters.

Our new programs for waterfowl and turkey hunting will require separate NEPA analysis and public involvement. We will pursue that analysis once we have developed the details of our new hunt proposals, which we expect to complete within 5 years.

Goals, Objectives, and Strategies

Relationship between Goals, Objectives, and Strategies

We developed our more detailed management direction hierarchically, from goals to objectives to strategies. Refuge goals are intentionally broad, descriptive statements of the desired future condition of refuge resources. By design, they define the targets of our management actions in terms more prescriptive than quantitative. They also articulate the principal elements of the refuge purposes and our vision statement, and provide a foundation for developing specific management objectives and strategies.

The objectives are essentially incremental steps toward achieving a goal; they further define management targets in measurable terms. Typically, they provide the basis for determining strategies that are more detailed, monitoring refuge

accomplishments, and evaluating our successes. “Writing Refuge Management Goals and Objectives: A Handbook” (USFWS 2004a) recommends writing “SMART” objectives that possess five properties: (1) specific; (2) measurable; (3) achievable; (4) results-oriented and (5) time-fixed.

A rationale accompanies each objective to explain its context and importance. We will use the objectives to help write the refuge step-down plans, which we described earlier in this chapter.

The strategies for each objective are the specific or combined actions, tools, or techniques we may use to achieve the objective. The list of strategies in each objective represents the potential suite of actions we may implement. We will evaluate most of them further as to how, when, and where we should implement them when we write our refuge step-down plans. We will measure our successes by how well our strategies achieve our objectives and goals.

GOAL 1:

Contribute to the biological diversity of the mid-Atlantic region by protecting, enhancing, and restoring the refuge’s upland habitats, with an emphasis on breeding, migrating, and wintering birds.

Objective 1.1 Short-Structure Grasslands/Breeding Habitat

Over the next 15 years, maintain and enhance up to 350 acres of short-structure native grasses and forbs, in fields with a minimum patch size of 50 acres and with perimeter-to-interior ratios ranging between 0.018 and 0.023 to meet the breeding season (May through June) habitat requirements of the grasshopper sparrow and other priority grassland-dependent birds identified in the BCR 30 plan and the VA WAP. Short-structure fields will also be defined by parameters including average vegetation heights up to 30 inches, a ratio of grasses to forbs between 2:1 and 3:1, no stand-replacing invasive species, and a patchy distribution of bare ground. Enhance grassland patches fragmented by artificial or unnecessary features through management that increases the percentage of effective interior habitat from its present levels.

Also in 15 years, achieve approximately 60-percent (on a 5 year average) use by grasshopper sparrows in available short-structure grasslands with a targeted density of about one pair every 4 to 8 acres. This is based on the breeding territory sizes (2–4 acres) and the average breeding density on the best refuge fields now being managed as grasslands (7.6 acres per territorial male; years 2004–2007).

Strategies

Continue to:

- Use habitat management decision tools (as in Watts 2000, or the Upland Habitat Decision Analysis, developed by Mitchell and Talbott (2003, unpublished on file at refuge office) and field evaluations to determine
 - 1) which fields are best to sustain as grassland habitat,
 - 2) which non-optimal grassland fields to replace with fields of higher potential for optimal grassland, and
 - 3) which fields coming out of crop production we should evaluate for their potential for optimal grassland habitat.

Important criteria in the decision tool include the proximity to other grasslands or agricultural fields, the shape, size, perimeter-to-interior ratio, and soils type, or the number of hours of sunlight per day a field receives. Increase the percentage of effective interior by switching sub-optimal grasslands with units of higher potential for optimal grassland, and build upon existing grasslands as opportunities become available.

- Remove trees and linear structures, such as fences and abandoned irrigation equipment, which cause fragmentation, edge effects, or spreading of woody plant seedlings in grasslands. Consolidate adjacent fields separated by these edge-forming features into larger units.
- Use prescribed fire as needed to remove biomass, stimulate native grass and forb growth, or reduce woody encroachment. Timing depends on specific fire objective: late winter, if only biomass removal is the objective so that cover and food would still be available during most of the winter; or, in early spring or late summer-early fall, if reduction of woody encroachment is necessary.
- Mow, brush-hog, disc and use herbicides as needed outside the breeding season. Some fields will require annual treatment where trees are problematic. Use only EPA-approved chemicals after developing an annual pesticide use proposal for each chemical approved by the Regional Contaminants Coordinator. When mowing or burning to improve habitat for migratory birds, we will strive to protect reptiles, amphibians, and other wildlife by conducting these activities during the winter months whenever possible. Raising mowing decks to at least 8" will also help protect turtles, snakes, and other wildlife when mowing must occur during times when these species are active.
- Plant native species of grasses and forbs to improve stand cover with the desired structural characteristics.
- Incorporate this habitat type in landbird point count surveys, migration and winter bird counts, and anuran call counts. Update the landbird point count habitat classification to reflect changes in the vegetation community that can be linked to corresponding shifts in the avian community.

Within 5-10 years of CCP approval:

Explore "flash" grazing as a tool for manipulating grasslands to create structural variation and set back succession in selected fields. This technique uses temporary or shorter rotation grazing. Designate fallow and unplanted fields and fields planted with warm season grasses as prospective sites for experimental grazing, well after the bird-breeding season. Evaluate the quantity of grazing (e.g. vegetation height, percent of area grazed, percent of area avoided), and vegetation response (e.g. re-growth of grazed plant, changes in vegetation composition) to determine if this strategy would meet population objectives. A grazing program would require a new compatibility determination and public review. Monitor to insure grazing does not introduce invasive species and discontinue if the costs do not outweigh the benefits.

Monitoring Elements

- Conduct appropriate monitoring and survey programs as funding and staffing permits to assess patterns of use and distribution of breeding grassland birds. The following are all components of how we would measure our success with respect to our means and fundamental objectives. Results may trigger adjustments to management strategies, or trigger a re-evaluation or refinement of our objectives. Examples of monitoring or surveys that we may implement include:
 - To measure abundance, relative abundance, and density (where appropriate), survey during the breeding season at this latitude (late May through June) on selected fields annually throughout the life of the CCP
 - To evaluate quality of grasslands for grasshopper sparrows, conduct periodic vegetation surveys during the breeding season at bird points for height, grass-forb ratio, and bare ground. If sparrow density or percent occupancy falls, and grass height, grass-forb ratio and percent bare ground is suggestive as being the cause, then this would be a trigger point for evaluating the management regime of the grassland

- To maintain desired quality and characteristics of grassland, annually conduct scouting for invasive plant species. We will afford zero tolerance to highly invasive or stand-replacing species. Occurrences or stands of more stable patches of invasive plants may be tolerated in the short term as long as their cumulative coverage is no more than 25 percent of a given management unit, and fundamental objectives are not compromised.

LeConte's sparrow

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Rationale

Importance of Grassland Habitat in Both a Regional and Local Context

The Service has the responsibility for protecting migratory birds under international migratory bird treaties with Mexico and Canada. Providing habitats for declining grassland-dependent species on this refuge will counter habitat loss elsewhere within the mid-Atlantic, western coastal plain region. We also consider the needs of birds of conservation concern on a sub-regional or statewide scale as identified in the VA WAP and BCR 30 Plan, and for which the refuge appears to contribute some responsibility, such as eastern meadowlark (VA WAP Tier IV species) and American woodcock (VA WAP Tier IV and BCR 30 species of concern).

Although this region was dominated primarily by deciduous hardwood forest at the time of European settlement, openings created by Native Americans or wildfires lay scattered throughout, according to early eyewitness accounts (Watts 1999, Grumet 2000, Askins 2000). As European-influenced agriculture spread westward and the prairies disappeared, abandoned eastern farms reverted to grasslands and old meadows. The east became even more important for eastward-emigrating grassland species displaced in the west.

However, some evidence suggests that grassland-dependent birds evolved here even before that period of farm abandonment, and actually may be native to the eastern United States (Askins 2000). Regardless of the origin of eastern grassland birds, agriculture has dominated the area on a landscape-scale for generations, and grassland-dependent species have now formed an integral component of our native avifauna.

Birds depending on early successional habitats such as grassland and shrub are one of the fastest declining bird groups because of habitat loss and changes in farming practices. For example, grasshopper sparrows have declined at a rate of 3.7 percent across the United States from 1966 to 1994 (Sauer et al. 1995). The loss of habitat, the conversion of pasture to intensive row crops, the increased frequency of mowing, and the lack of fire are cited as the causes of population declines of that and other grassland-dependent species (Vickery 1996). Hence, several national bird conservation organizations and Federal and state agencies advocate management to benefit grassland birds in such plans as the PIF Area 44 Plan, the BCR 30 plan, and the VA WAP.

The lands within the refuge acquisition boundary host a variety of the grassland birds of conservation concern those plans identify. The refuge grasslands serve an important regional role for many species throughout the year. Some are year-round refuge residents, while others use the refuge only during the breeding season or winter, or during spring and fall migration.

We designed our management objectives to provide quality habitat for a wide variety of grassland-dependent birds throughout the year, and distinguish between those birds that prefer short-structure (objective 1.1) versus tall-structure grasslands (see objective 1.2). It is also important to note that, although our objective statements focus on birds of elevated conservation concern identified in regional and state plans, we are also striving through our management to “keep common birds common.”

Importance of Grassland Size and Structure, Especially for the Grasshopper Sparrow

Few landowners of large tracts of land can afford to devote their land solely to wildlife conservation. Since much of the land that has become available for Service acquisition consists of farms containing large crop fields, an opportunity to create large blocks of quality habitat is presented on refuge lands, particularly since those crop fields provide “open” habitat. In contrast, the conversion costs to create grasslands from older stages of succession are prohibitively expensive for many private individuals—initially \$125 or more per acre (Watts 2000).

Field size is an important criterion for determining whether a given field is potentially suitable for breeding grassland-dependent birds. If patches are too small in size or too linear in shape, there is a greater potential for adverse edge effects, such as predation or nest parasitism, as well as woody or invasive plant encroachment. Such patches have a high perimeter-to-interior ratio, making the interior more accessible to predators and invasive species, thus degrading the quality of the patch and likely diminishing the breeding success of grassland birds. The perimeter-to-interior ratio equals the length of the edge around a patch divided by the area of the patch (Helzer and Jelenski 1999; Bakker et al 2002). Block shapes with less than 1,640 feet of edge per 2.5 acres provide more habitat area that is distant from edges (Watts 2000). An ideal patch would be ample enough to accommodate a buffer zone of approximately 300 feet around the edge and provide ample effective interior for the target species’ nesting territories. Vickery et al. (1999) recommends conserving grassland patches of 250 acres or more to benefit more area-sensitive species. Watts et al. (1997) determined that grassland patches of less than 25 acres are better suited for shrub-dependent birds, another suite of bird species of conservation concern.

The grasshopper sparrow is observed frequently in the agricultural parts of the region, including within the refuge acquisition boundary. This sparrow requires grassland habitat for breeding. The extensive agricultural coverage on the landscape resembles the early succession openness of the midwestern prairies and, probably, is the main cue that attracts the sparrow to our area. Fallow fields and pastures associated with farmlands provide habitat, while the row crops nearby provide additional foraging and loafing areas. We commonly observe grasshopper sparrows loafing and foraging on insects in adjacent soybean fields.

Unfortunately, grasshopper sparrow abundance on the two Northern Neck Breeding Bird Survey (BBS) routes has declined in recent years with the gradual disappearance of open fields, changes in farming practices, and rising development near those routes. The presence of grasshopper sparrows at the Sharps BBS route has dropped by nearly half in the past 2 years (2005–2006) (Ake 2006, Portlock 2006).

The grasshopper sparrow is an area-sensitive species; it will not settle in areas too small, and requires grassland habitat patches at least 30 acres in size. The breeding territories range between 2 and 4 acres (Jones and Vickery 1999). Grasshopper sparrows were more abundant and more frequent in larger patches of mixed prairie; however, the edge-to-interior ratio was a better predictor of area sensitivity than patch size in a Canadian study on nine grassland passerines (Davis 2004). Vegetation structure was also an important predictor of grassland songbird abundance and occurrence, at least for the additional variation beyond what patch size or edge ratio would predict (Davis 2004).

According to Schroeder and Askerooth (1999), grasshopper sparrows show a preference for grasslands of relatively short-stature, approximately 12 inches, with a patchy distribution of bare ground on which to forage (Vickery 1996), and avoid areas with extensive shrub cover (Vickery 1996). Woody stems and tall forbs are used for song perches (Vickery 1996, Schroeder and Askerooth 1999, Watts et al. 1997, Vickery and Herkert 1999, Watts 1999).

On the refuge grasslands, grasshopper sparrows consistently have shown fidelity to fields of intermediate-height grasses (between knee- and waist-high) containing scattered tall shrubs and forbs in addition to fields planted in short-stature grasses such as little bluestem, sand lovegrass, and sideoats grama (Spencer, personal observation). Those heights probably are at the upper limit of the species' tolerance; abundance and density may increase if we could maintain shorter heights. Because the habitat characteristics for breeding grasshopper sparrow territory are so restrictive, their requirements will serve as the benchmark standard to guide short-grass management on the refuge.

Some refuge fields used by grasshopper sparrows are in fallow cover types (e.g. not planted) which grow tall as the growing season progresses into late summer. The short-structure requirement appears to be only necessary during the breeding season (May through June), as these same fields continue to be used by the adults and their fledglings even as the vegetation gains height throughout the summer before migration (Spencer, personal observation). Objective 1.2 below describes our management for tall-structure grasslands.

The same habitat characteristics for grasshopper sparrow would also benefit other grassland-dependent birds (Watts 2000) such as American woodcock and eastern meadowlark.

The average density of obligate grassland breeding birds over the 3 years of a grassland-breeding bird study on the refuge (2001–2003) was 0.416 per acre (1.04/hectare) on fallow fields, and 0.70 per acre (1.75/hectare) on planted warm-season grass fields for the seven refuge fields enrolled in the study. Grasshopper sparrows composed 97.2 percent of the obligate species seen. For a quick density estimate of the entire grassland component of the refuge, one can scale those figures up to the areas of all the fields being considered (Michael C. Runge, USGS, November 2006, personal communication).

Those results and that method of estimating density should be viewed with caution, due to the newness of the fields at the time of the study and their rapidly changing characteristics, and the variability at the microsite level of different fields. In subsequent years, the vegetation in some of the planted fields became too dense and tall, especially after burning, to be attractive to grasshopper sparrows, except where recent mowing provided shorter grass. In other fields, whether planted or fallow, grasshopper sparrow abundance increased over the years as long as the vegetation was relatively short (about 1 meter).

With the addition of data on grasshopper habitat occupancy and density, we can determine if we are achieving our objectives for this species. We can use the data to refine objectives in the future and determine if our means objective (field characteristics) is correct for achieving the fundamental objective. If not, we can modify means objectives.

Objective 1.2 Tall-Structure Grasslands/Breeding Habitat

Over the next 15 years, maintain and enhance up to 350 acres of tall-structure native grasses and forbs at heights averaging 30–40 inches in fields with a perimeter-to-interior ratio between 0.018 and 0.023, and in minimum patch sizes of 50 acres, with at least one field of 200 contiguous acres in size, to meet the breeding season (May through June) habitat requirements of priority grassland-dependent birds identified in the VA WAP and BCR 30 Plan, such as Henslow's sparrow and northern bobwhite, and for dickcissel.

Tall-structure grasslands on the refuge will range in height from 30–40 inches, with bunchgrass density at about 2 to 3 bunches per square meter on average throughout the unit, will contain a grass-forb ratio between 2:1 and 3:1 on average through the unit, and will contain no stand-replacing invasive species. Each year throughout the term of this plan, provide at least one field of at least 200

contiguous acres in size. Also through management, increase the percentage of effective interior habitat from current levels in those patches fragmented by artificial or unnecessary features.

Strategies

Within 5 years of CCP approval:

In addition to the strategies of objective 1.1, the following will also apply

- Vary the management techniques (such as spot mowing to create varying heights) among fields to improve the diversity of native grasses and forbs and to create a mosaic of different grassland structural types. The need for a patchwork mosaic and more structural diversity is more critical in tall grasslands, which would otherwise become too dense.
- Mow, brush-hog, and burn on a two-year cycle or as needed to reduce woody encroachment. Some fields require annual mowing in sections where soil moisture and proximity to colonizing tree species (sweetgum, maple, tulip poplar, black locust) promotes competition with desired grasses and forbs.

Monitoring Elements

- Conduct appropriate monitoring and survey programs as funding and staffing permits to assess patterns of use and distribution of breeding grassland birds. The following are all components of how we would measure our success with respect to our means and fundamental objectives. Results may trigger adjustments to management strategies, or trigger a re-evaluation or refinement of our objectives. Examples of monitoring or surveys that we may implement include:
 - To evaluate achievement of the fundamental objective (percent use and density of dickcissels and northern bobwhite), conduct point counts established in grasslands for surveys during the breeding season at this latitude (late May through June) to measure abundance, relative abundance, and density (where appropriate) on selected fields annually throughout the life of the CCP
 - To evaluate quality of grasslands for breeding dickcissels, northern bobwhite, or migrating bobolinks, conduct periodic vegetation surveys at bird points for height, density measurements (as a function of bunches per square meter and bare ground percent), and species composition or grass-forb ratio.
 - To maintain desired quality and characteristics of grassland, annually conduct scouting for invasive plant species. We will afford zero tolerance to species that are highly invasive and stand-replacing. Occurrences or stands of more stable patches of invasive plants may be tolerated in the short term as long as their cumulative coverage is no more than 25 percent of a given management unit, and fundamental objectives are not compromised.

Rationale

See our rationale for objective 1.1, for a discussion of the regional and local importance of managing for large, contiguous grassland habitats to support grassland-dependent birds of conservation concern and other native wildlife. That objective presents our rationale for managing approximately 50 percent of our existing grasslands and old-field habitat in a short structure on the refuge. Our rationale for managing the remaining 50 percent of grasslands and old-field habitat in a tall structure follows.

Some of the refuge grasslands have been planted in tall-grass species, such as big bluestem, Indiangrass, and common sunflower, to benefit the entire suite of breeding tall-grass birds, rather than focus on a single species, and to facilitate the establishment of stable, more easily maintained stands. The most recently

restored tall-grass fields on the refuge are dense and lack structural diversity, but over time, selective manipulations of those fields should promote a more complex patchwork that is diverse in structure and composition, the better to mimic natural grasslands.

We have not documented breeding Henslow's sparrows on the refuge and they are thought to be extirpated from this area. However, they do still occur elsewhere in Virginia and the patch size and structural dimensions we target in our objective will serve as the benchmark standards for guiding our tall-grass management in hopes of attracting that species. We are hopeful that through active management over time, breeding Henslow's sparrows could be attracted to refuge fields that meet their preferred vegetation characteristics and patch dimensions

Henslow's sparrows historically were common in large, open fields and marshes in Virginia. They were recorded in various locations, including Arlington, Fairfax, Virginia Beach, Saxis Island and the Chesapeake Bay marshes. Their numbers declined precipitously throughout the 1900s. More recent records, and sightings of single singing males, suggest scattered, sporadic breeding in the area. The nearest official records of Henslow's sparrows are in Lewisetta (Northumberland County, 1993) and in Dumbrooke (Essex County, 1993) (Rottenborn and Brinkley 2006, in press). The Radford Armory now appears to be the only established colony, except for rumors of another population near Fort Pickett (Heath, VARCOM, Sept. 2006 personal communication).

Essential habitat for breeding Henslow's sparrows in the coastal plain includes high marsh black needlerush and saltmeadow hay communities, but also large grassland patches greater than 100 acres, with high litter depth, low forb cover, and low bare ground exposure. This sparrow prefers tall grass up to 30-31 inches (VA WAP, 2005). No relationship is documented between perimeter-to-interior ratio and the probability of occurrence for these sparrows.

Northern bobwhite are a high conservation priority for our area that we feature in this objective. They are ranked as a high priority species in the BCR 30 plan and a Tier IV species in the VA WAP. The loss of early succession habitat, particularly nesting cover and brood range, has been identified as the most significant factor limiting their populations (VDGIF, 2008). The VA WAP states that populations of this species have demonstrated a declining trend and it may qualify for a higher tier rank in the foreseeable future. The habitat loss and resulting population declines have been attributed to the loss of open lands to development, the transition to "cleaner" agricultural practices, and to increased predation pressures. According to the BCR 30 Plan, they require patches of bare ground interspersed with standing vegetation. Within this physiographic region, bobwhites utilize active agricultural fields, grasslands and early successional old fields, lightly grazed pastures, and recent clearcuts, all with a shrubby cover.

Eventually, we also hope to attract nesting bobolinks to refuge grasslands and old fields, assuming we can provide their preferred vegetation characteristics and patch dimensions for breeding habitat. Bobolinks are already documented using refuge fields during spring and fall migration. They are known to breed in Maryland, and the Virginia Gold Book reports that bobolinks inhabit the northwest part of Virginia only in sporadic colonies. Breeding locations are known in Virginia's Loudoun, Fauquier, Warren, Clarke, Highland, and Augusta counties (Heath, VARCOM, 2006 personal communication).

Another species of particular interest to us is the scattered small populations of dickcissels which are showing site fidelity to several refuge tracts and return each spring and summer. Indications of breeding include sightings of both sexes and mating attempts. This is not currently a species of high concern identified in the VA WAP or BCR 30 Plan. However, until Henslow's sparrow or breeding bobolinks appear, we will use dickcissels as an interim indicator species of quality

**Objective 1.3 Grasslands/
Migrating and Wintering
Habitat**

breeding and nesting habitat for those two species since their habitat requirements are similar. Our management of tall-grass and old-field habitats will also benefit generalist species of concern such as the field sparrow, indigo bunting, blue grosbeak, eastern kingbird, and orchard oriole.

Management of grasslands adjacent to vernal pools or low-lying wet areas is also essential for breeding amphibians. The section on wetlands, objective 3.1, “Wet Meadows, Ponds, and Vernal Pools,” discusses that in more detail.

Within the next 15 years, manage the grassland habitat identified in objectives 1.1 and 1.2, throughout the migration and wintering seasons (August through February) to provide forage and cover for wintering grassland birds identified as species of concern in the BCR 30 plan and the VA WAP, such as the savannah sparrow, eastern meadowlark, horned lark, northern harrier, and barn owl, and for migrating grassland birds such as the bobolink.

Total acres and patch sizes are less stringent during migration and winter, but will be consistent with management actions needed to maintain short- and tall-structure breeding grassland bird habitat described in objectives 1.1 and 1.2.

Strategies

Continue to:

- Delay mowing or other grassland maintenance management until the end of February or early March in any fields not requiring late summer or fall management to reduce tree encroachment.

Monitoring Elements

- Conduct appropriate monitoring and survey programs as funding and staffing permits to assess patterns of use and distribution of wintering grassland birds. The following are all components of how we would measure our success with respect to our means and fundamental objectives. Results may trigger adjustments to management strategies, or trigger a re-evaluation or refinement of our objectives. Examples of monitoring or surveys that we may implement include:
 - winter grassland transect surveys for measuring composition and relative abundance of grassland birds in select fields (fundamental objective);
 - Christmas Bird Counts and other non-standardized but repeated observations to determine habitat use and distribution (fundamental objective).

In addition to helping us evaluate the refuge grassland management, winter grassland data will help us determine the statewide or regional contribution of the refuge to wintering grassland passerines.

Rationale

Our responsibility for providing grassland bird habitat is not limited to the breeding season. The refuge acquisition boundary lies in an important migratory bird pathway along the western Chesapeake Bay of the Atlantic flyway. Migrating grassland birds stop or winter in refuge grasslands and fallow fields. Savannah sparrows, swamp sparrows, eastern meadowlark, horned lark, northern harrier, and American pipits are examples of grassland bird species that increase in abundance in the winter. Bobolinks are locally abundant during spring and fall migration (Rottenborn and Brinkley, 2006, in press) and are observed consistently during migration on refuge tracts (Sandy Spencer, personal observation). Sedge wrens are occasional visitors at the refuge during migration. Barn owls use these fields year-round.

Our management for wintering grassland birds also benefits from proximity to adjacent private croplands, versus other habitat types or land uses. The crop fields that can provide supplemental foraging areas complement the attractiveness of refuge fields for grassland birds such as horned larks, eastern meadowlarks, and American pipits.

Objective 1.4 Grasslands/ New Areas

Over the next 15 years, as opportunities arise through new Service acquisitions or the phasing out of cropland management on refuge lands, increase the grassland component of refuge habitat types from its current 700 acres, to a maximum of 1,200 acres, maintaining the relative 50:50 ratio between short-structure and tall-structure grasslands, subject to the same standards of quality, the same target species, and the same seasonal considerations detailed in grassland management objectives 1.1 to 1.3.

Strategies

Within 5 years of CCP approval:

- Evaluate all refuge crop fields to determine whether to phase them out of production (within 5 years) using habitat management decision tools for determining suitability for grasslands (as in Watts 2000, or the Upland Habitat Decision Analysis, Mitchell and Talbott 2003, unpublished, on file at refuge office) and field evaluations, as described above in objectives 1.1 and 1.2.
- As part of this evaluation, considering the potential for using <150 acres of existing crop fields on the Tayloe tract to demonstrate and interpret best management farming practices that protect water quality and benefit wildlife habitat.
- Evaluate all future land acquisitions using habitat management decision analyses building upon existing grassland acres where feasible and practicable.

Monitoring Elements

- Establish monitoring program similar to those in objectives 1.1–1.3.

Rationale

We describe our rationale for managing grasslands habitat throughout the year in objectives 1.1 to 1.3 above.

We have been gradually phasing out croplands on the refuge since its peak in 2000 when we had approximately 620 acres. We would phase-out the remaining 210 acres over the next 5 years. Those acres, along with any potential future acquisitions that include farmland fields, would provide the additional sources for increasing the grassland acreage on the refuge.

We have generated some controversy with our decision to remove lands from agricultural production and convert them to native habitats on some tracts purchased in fee. There is a need to conduct additional outreach to inform local citizens and visitors about the evolution of wildlife management practices over the past several decades.

Although to plant crops and establish food plots for wildlife was once common, we now believe wildlife populations will fare better if we restore and manage the full complement of plants native to our area. One way to conduct that outreach is through informational displays that interpret the changes in wildlife management and explain the rationale behind the shift. The ideal place to conduct that outreach would be the Tayloe tract, where farming now goes on, and where it has gone on for centuries. Using this area also to interpret conservation measures would be advantageous, in that all farmers could employ them to more effectively retain nutrients and sediments, and thereby, protect water quality and create wildlife habitat. Therefore, we might retain farming in some areas for that purpose. If so,

we would prepare a new compatibility determination and seek additional public input on the design of such a program.

Regarding future land acquisition at the refuge, it is important to explain that we are not targeting croplands per se in our land protection program. We expect that most of the active cropland we would acquire in the future would be under a conservation easement. However, we could acquire some cropland as part of a larger fee title purchase to protect quality wildlife habitat

We would manage the farmlands we purchase in fee title to be grasslands or another native habitat type. We would evaluate crop fields as to their best habitat use, whether forest, shrub, or grassland, using field evaluations and the habitat management decision tool described above. The potential to acquire an additional 500 acres of cropland over the next 15 years is a reasonable estimate, but it is not definite. We based the upper limit of 1,200 acres on our best judgment of our management capability over the next 15 years; it is not an upper limit on the biological capacity of present or future refuge lands.

Objective 1.5 Stable Long-term Shrub Habitat

Within the next 15 years, manage relatively stable, long-term, native shrub habitat in blocks between 5 acres and 25 acres where our habitat management decision tool and field evaluations recommend shrub habitat over grassland or forest management, where 50 percent of their area is used during at least one season (breeding, migration, winter) by high-priority, shrub-dependent birds of conservation concern identified in the BCR 30 plan and the VA WAP, such as the American woodcock, bobwhite, and prairie warbler; and other species such as the yellow-breasted chat, worm-eating warbler, eastern towhee, brown thrasher, field sparrow, and whip-poor-will. Decision criteria favoring long-term shrub habitat include the presence of moist soils, habitat patch sizes below 25 acres, or patches in a configuration or location that do not justify intensive, mechanical grassland management.

Strategies

Continue to:

- Complete field evaluations on each refuge field within 3 years of CCP approval, using the habitat management decision tools (as in Watts 2000, or the Upland Habitat Decision Analysis, Mitchell and Talbott 2003, unpublished, on file at refuge office). Detail those decisions and implementation plans in the refuge HMP and AHWP. Evaluate lands acquired in the future within 1 year of acquisition.
- Brushhog on a four-year rotational schedule (Watts 2000), or more frequently if necessary, those areas identified suitable for long-term shrub habitat which require active management, such as manipulating field corners, edges, and pockets formed by forest/field interface.
- Identify areas of potentially stable, long-term shrub habitats that could be self-maintaining by virtue of their hydrology (such as low-lying fields, semi-permanent wet meadows, beaver meadows, or dry, sandy soils).
- Plant native shrub species where warranted, and as funding and staffing resources permit, to promote establishment of volunteer, native shrub species, and prevent tall-tree encroachment, where appropriate, through selective thinning or occasional brush-hogging.
- Evaluate cooperatively farmed acres when they come out of production for their potential as long-term, stable shrub habitats to increase acreage of shrub habitat.

- Incorporate this habitat type in landbird point count surveys, migration and winter bird counts, and anuran call counts. Update the landbird point count habitat classification to reflect changes in the vegetation community that can be linked to corresponding shifts in the avian community.

Monitoring Elements

- Conduct appropriate monitoring and survey programs as funding and staffing permits to measure our success with respect to our means and fundamental objectives. The results may trigger adjustments to management strategies, such as thinning, brush-hogging, burning, planting, or selective removal to achieve structural and species diversity of native shrub species and to remove trees. Results may also trigger a re-evaluation or refinement of our objectives. Examples of monitoring or surveys that we may implement include:
- Continue to incorporate this habitat type into ongoing biological surveys, such as habitat-based landbird point count surveys, migration and winter bird counts, and anuran call counts. Landbird point count habitat classifications in shrub zones would be updated to track changes in habitat relative to bird habitat use.

Rationale

Shrub-dependent bird species are also rapidly declining due to loss of habitat. Shrub habitat comprised of various shrub species, or a diverse mix of young trees, provide an abundance of insect food for breeding birds, which need to consume large amounts of protein for reproduction and feeding young. Many shrub species also bear fruit in the fall, which helps boost the fat reserves for migrating or over-wintering birds. The structural density in this habitat type also provides cover from predators and shelter from harsh weather. Shrubby, early succession patches in close proximity to interior forest breeding territories are also important for survival of fledgling forest birds, which feed on the abundant food sources in relative safety from predators in the dense foliage.

Shrub habitat, in close proximity to grasslands, provides an alternative for many species when management actions, such as burning or mowing, temporarily remove grassland habitat. Some locations at the grassland-forest interface lend themselves particularly well to rotational shrub management where their constricted configuration, such as in tight corners or where they occur in small, interspersed pockets, make grassland maintenance difficult. These areas can be periodically set back through mechanical treatments to provide a continued source of shrub habitat. Some areas are naturally in shrub cover due to moist soils, but that is in very limited supply.

In addition to being transitional in nature, shrub habitats are quickly disappearing because of certain forestry and agricultural practices and increased development. Shrub-dependent birds will need to rely more heavily on intentional provisions of this habitat type by land managers.

American woodcock are morphologically classified as a shorebird, but their habitat preferences throughout the year range from uplands to wetlands. They favor woody succession habitats on moist soils where worms are abundant and use the shrubby forest floor for nest sites. Here, they are well camouflaged for daytime foraging. Because of high moisture content, those areas tend to be composed of woody vegetation in either shrubs or young tree species or both. Woodcock also need more open, short-grass habitat for singing and display territory during the breeding season, so shrublands in close proximity to short grasslands are ideal. Ideally, breeding habitat is early successional forest with little or no underbrush and abundant insects.

The northern bobwhite also uses the cover and food resources provided by shrub and early successional forest habitats. They have a wide range of dietary preferences. Prairie warblers favor early succession forests and shrubby habitats where they can glean insects, especially leaf-eating caterpillars in the treetops and hide their nests in the foliage. The Eastern towhee and brown thrasher prefer drier, shrubby habitats typically found along forest and field edges, where the confusion of growth is more complex and offers a variety of fruits, nuts, and insects among the leaf litter. The field sparrow, a year-round resident of the refuge, favors old-field/forest edges where woody encroachment, tall forbs, vines and shrubs are well represented in an otherwise open habitat, where it can quickly flee for cover in the adjacent forest. It builds its nests low to the ground in young saplings or shrubs. That scenario frequently appears in landscapes containing a mosaic mix of field and forest or in regenerating, cut-over areas. The whip-poor-will is still somewhat common in the rural landscape within the refuge boundary compared to more developed regions of the state, but is believed to be declining at about 23 percent per year between 1980 and 2005 elsewhere in Virginia (USGS Breeding Bird Survey 2007).

The vegetation structure and food supplies provided by shrub habitats benefit other species such as blue-winged warbler and willow flycatcher that use the refuge during migration, as well as breeding yellow-breasted chats, and resident gray catbirds.

Because of reduced exposure, patch size requirements for shrub species are much smaller than the minimum size requirements for area-sensitive grassland species. Patches less than 25 acres are adequate for shrub-dependent species (Watts 2000). Minimum patch sizes would vary according to habitat quality (vegetation density), landscape and surrounding vegetation. We are evaluating all fields with a hydrology, soil type, and size and configuration, and exposure to sunlight that would not support quality grassland habitat for its potential as long-term shrub or wet meadow habitat.

Objective 1.6 Transitional Shrub Habitat

Within the next 15 years, provide interim shrub and early successional forest habitat on 600 reforested acres, including those planted or undergoing natural succession, to support breeding, high priority shrub-dependent birds of conservation concern such as American woodcock, bobwhite, and prairie warbler, identified in the BCR 30 plan and the VA WAP. This habitat would occur in a shifting mosaic of patches across the refuge as we implement decisions to allow fields, shrub, and young forest to transition to forest. Also, where appropriate, manage shrub habitat to increase the effective interior of any surrounding forest habitat.

Strategies

Continue to:

- Allow a selection of existing former crop fields on Laurel Grove, Hutchinson, Tayloe, Thomas, Wellford Fee, and Wilna tracts, which are not optimal for grassland and would better serve to enhance riparian zones or effective forest interior, to undergo natural succession or planting in native trees. This would provide temporary shrub habitat for 10 to 15 years until those areas reach young forest stage.

Monitoring Elements

- None planned, except continue to scout and map the presence of invasive plants to identify any threats to habitat quality

Rationale

We describe the important contributions of shrub habitats in the rationale for objective 1.5 above. The 600 reforested acres we describe in this objective are in

the early stages of transition to forest, and will temporarily (approximately 10–15 years) provide the same structure and diversity, and thus the same benefits for species of conservation concern, as the long-term shrub habitat.

The formerly open lands that have been reforested now support priority shrub-dependent species such as the American woodcock, northern bobwhite, and prairie warbler, as well as other shrub species such as the blue-winged warbler, brown thrasher, eastern towhee, field sparrow, northern bobwhite, whip-poor-will, willow flycatcher, gray catbird, and yellow-breasted chat. This objective also benefits two priority forest species in the VA WAP and BCR 30 plan, the scarlet tanager and wood thrush, which depend on this habitat type during their fledgling nesting stage. Eventually, these lands will substantially increase the forest component of the refuge for migrating or forest-dependent birds.

Objective 1.7 Upland Mixed Forest Habitat

Within the next 15 years, enhance the existing 1,563 acres of upland mixed forest habitat on the refuge, but also seek opportunities through future refuge acquisitions and management, to increase the amount and distribution of this forest type, and to promote its biological integrity, diversity and environmental health. Management would strive to create large contiguous forest patches of at least 250 acres, protect corridors that connect those large patches, and improve structural diversity, to benefit birds and other native wildlife of conservation concern throughout the year identified in the BCR 30 plan and VA WAP such as scarlet tanager, wood thrush, eastern hog-nosed snake, eastern ribbon snake, and eastern box turtle.

Strategies

Continue to:

- Acquire land with upland mixed forest in fee simple or conservation easement. Build upon existing tracts where possible.
- Establish threshold criteria for responding to beaver damage, as noted in “General Refuge Management” narrative, and for disease outbreak intervention.
- Perform early detection and rapid response control of invasive, undesirable plants, pathogens, and animal species, and diseases.
- Target areas characterized by small or narrow patches of disjunctive forest stands that we could consolidate to increase effective interior and reduce edge effects. Consolidate areas through reforestation of openings (either by natural succession or by plantings native species) that are not otherwise serving another priority habitat need.
- Create connection corridors from isolated stands, as long as this does not fragment managed grasslands, through native plantings or natural succession.
- Incorporate this habitat type in landbird point count surveys, migration and winter bird counts, and anuran call counts. Update the landbird point count habitat classification to track changes in forest habitat relative to bird habitat use.

Within 5 years of CCP approval:

- Increase the structural and species diversity in overstocked monotypical stands of tulip poplar, e.g. 1,000 trees per acre (or 10 per 20 feet×20 feet) and in patches greater than 5 acres.
 - Conduct stand inventories for potential areas needing restoration or management; incorporate prescriptions and implementation strategies in the HMP and AHWP as appropriate. Continue to map and scout for the presence

of disease, nuisance species, invasive plants, or any other threats to forest health.

- Perform early detection and rapid response control of invasive, undesirable plants, pathogens, and animal species, and diseases.
- Use pre-commercial mechanical and selective thinning, ensuring minimal disturbance impacts (soil erosion and compaction, introduction of non-native invasive plants, and fragmentation). Thin such stands using pre-commercial mechanical or selective thinning down to a range between 150 and 200 trees per acre (depending upon basal areas, slope, exposure, and surrounding shelter).
- Implement standard operating procedures approved by the VA SHPO to avoid damaging potential historic or archeological resources during forest management.

Monitoring Elements

- Conduct appropriate monitoring and survey programs as funding and staffing permits to measure our success with respect to our means and fundamental objectives. The results may trigger adjustments to management strategies, to achieve structural and species diversity or improve forest health, or results may trigger a re-evaluation or refinement of our objectives. Examples of monitoring or surveys that we may implement include:
 - Continue to map and scout for the presence of disease, nuisance species, invasive plants, or any other threats to forest health.
 - Continue to incorporate this habitat type into ongoing biological surveys, such as the habitat-based landbird point count surveys, winter or summer bald eagle surveys in riparian areas, migration and winter bird counts, and anuran call counts. Landbird point count habitat classifications in upland mixed forests would be updated to track changes in habitat relative to bird habitat use.



USFWS

Youth fishing day

Rationale

On a landscape scale throughout the region and in the refuge acquisition boundary, large tracts (>250 acres) of mature or maturing deciduous and mixed forests are in limited supply, and becoming increasingly fragmented. In addition to providing important breeding habitat for forest-interior birds, the geographical orientation of these forests along the western side of the Chesapeake Bay and their proximity to tributary creeks make them important stopover sites during migration and as wintering grounds for a wide variety of forest birds.

The same concepts and concerns for maximizing effective interior, and minimizing edge effects and edge-to-interior ratio discussed in the grasslands objectives above, also apply to forest habitats. Maintaining forests in large blocks, particularly those surrounding or containing water features and low-lying areas, increases the probability of providing and protecting breeding and over-wintering habitat for amphibians, reptiles, and invertebrates, and protecting rare plant communities over a broader spatial distribution. This strategy also serves to maintain the biological integrity,

diversity, and environmental health of the refuge forests for state-listed species such as the eastern hog-nosed snake, eastern ribbon snake, and eastern box turtle.

The refuge already includes substantial acreage (3,332 acres) of large forested tracts of mature and maturing mixed hardwood, mixed pine-hardwood (where oaks and pine constitute at least 25 percent of the stocking)(Hamel 1992), hardwood bottomland, and pine (loblolly and Virginia pine). Because of past land use history, the refuge forests are highly altered; stands tend to be in various mixes of natural and managed species, age classes, configurations and sizes, and health conditions. Although we have yet to perform a detailed forest inventory on the refuge, we are not aware of any stands of old growth. We assume that many of those stands established opportunistically after agricultural production ceased. Consolidating those forested acres into 250-acre patches or larger, through either management or future acquisition, is a priority under this objective.

Another priority is to promote a diversity of forest types and age classes in those stands, and prevent encroachment by invasive non-native vegetation. Generally, our strategy would allow natural succession to proceed without intervention to the extent possible, as long as it does not jeopardize our objectives of increasing species and age class diversity and protecting forest health. Simply put, acquiring and consolidating additional upland mixed forestlands, which require minimal management, is a very effective, efficient strategy over the long term for providing significant benefits to forest-dependent species across a number of taxonomic groups. Furthermore, it is essential that we maintain and enhance the biological integrity, diversity, and environmental health of our forest tracts according to Service policy 601 FW3. To this end, we would promote the natural forest processes of succession, regeneration, senescence and decomposition, progression toward structural and species diversity, soil maturation, and the variety of hydrological regimes that add diversity to forest composition. These factors also serve as the foundation for quality habitats for other taxonomic groups such as reptiles, amphibians, and macro-invertebrates.

In overstocked, monotypic tulip poplar stands, improvements to structure and diversity would benefit breeding hardwood forest species such as wood thrush, scarlet tanager, Swainson's warbler, Kentucky warbler, black and white warbler, chimney swift, yellow-throated vireo, and whip-poor-will.

The wood thrush and scarlet tanager are two high priority bird species that are common breeders throughout the refuge acquisition boundary and on refuge-owned land. We have selected them as focal species for management because their requirements for patch size, shape or dimension, and landscape context, described in the PIF Area 44 Plan, would also benefit many other forest interior bird species, and a variety of amphibians and reptiles (Rosenberg, et al, 1999 and 2003). Our intent is not only to meet the breeding and post-fledging requirements for wood thrush and scarlet tanager, but also to benefit co-occurring species of conservation concern identified in the BCR 30 plan and VA WAP, such as the eastern wood peewee, Kentucky warbler, cerulean warbler (migrant), Louisiana waterthrush, yellow-throated vireo, and whip-poor-will (Rosenberg et al. 1999).

Those forests would also provide year-round habitats for a number of amphibian species, and for at least four state-listed reptile species, including eastern hog-nosed snake, eastern ribbon snake, spotted turtle, and eastern box turtle. Although those are not focal species, they are state species of conservation concern, and we want to consider benefits for other taxa that use the same habitat types as our target species. We will not measure them except on an occasional, opportunistic basis.

Highly suitable habitat for these species consists of

- 1) mature or maturing deciduous or mixed forest patches containing a mosaic of age classes and structures, with some mid-story species and some areas of early succession

- 2) a shape approximating a circle or square to provide a low edge-to-interior ratio;
- 3) contiguous patches of greater than 250 acres, and, 4) a setting in a context of 70-percent forest in the surrounding 2,500 acres, or is less than half a mile from an extensive forest tract.

The minimum area needed to provide highly suitable habitat for these species relates inversely to the percent of forest cover within a 1.2-mile radius of the core area. For example, if a landscape (defined as an area of 2,500 acres) is 70-percent forested, the minimum patch size for highly suitable habitat would be 66 acres. If the same 2,500 acres were only 40-percent forested, the minimum patch size for highly suitable habitat would be 605 acres. In general, patches exceeding 250 acres, having a low edge-to-interior ratio, such as round or square shapes, and that would afford breeding territories that are at least 330 feet from the edge, have demonstrated lower rates of predation and nest parasitism (Rosenberg et al. 1999 and 2003).

Another way to estimate suitability is to measure the degree of isolation of a given patch—its distance from larger tracts of contiguous forest. Patches less than 100 acres are more suitable the closer they are to larger tracts. For example, a 100-acre patch one-quarter of a mile from a large forest is 88 percent as likely to support breeding scarlet tanagers as an unfragmented forest; a similar patch half a mile away is only 70 percent as likely. Wood thrushes need about 5 acres containing a mix of understory and canopy trees per pair for a breeding territory (Rosenberg et al. 2003). Scarlet tanagers need approximately 12 acres per breeding pair (Hamel 1992), and prefer a higher denser canopy cover composed of a variety of species of 9 inch–12 inch diameter (Rosenberg et al. 1999).

Objective 1.8 Hardwood Bottomland Forest

Within the next 15 years, sustain the existing 453 acres of hardwood bottomland forest on the refuge, but also seek opportunities through future refuge acquisitions and management, to increase the amount and distribution of this forest type, and to promote its biological integrity, diversity and environmental health.

Management would strive to create large, contiguous patches of forest (at least 250 acres), and protect corridors that connect those large patches to benefit forest-dependent birds of conservation concern identified in the BCR 30 plan and the VA WAP, such as the Louisiana waterthrush, Swainson's warbler, prothonotary warbler, and Kentucky warbler; and to benefit herpetofauna of conservation concern identified in the VA WAP, such as the eastern ribbon snake, spotted turtle, and eastern box turtle.

Strategies

Continue to:

- Target areas characterized by small or narrow patches of disjunctive forest stands that we could consolidate to increase effective interior and reduce edge effects. Consolidate areas through reforestation of openings (either by natural succession or by plantings native species) that are not otherwise serving another priority habitat need.
- Create connection corridors from isolated stands, as long as this does not fragment managed grasslands, through native plantings or natural succession.
- Acquire land with hardwood bottomland in fee simple or conservation easement. Build upon existing tracts and protect uplands surrounding tracts, where possible, to enhance the quality and function of existing habitat areas.
- Establish threshold criteria for responding to beaver damage, as noted in "General Refuge Management" narrative, and for disease outbreak intervention.

- Perform early detection and rapid response control of invasive plants and other undesirable species.
- Where applicable, target areas characterized by small or narrow patches of disjunctive forest stands that could be consolidated to increase effective interior and reduce edge effects. Consolidate areas through reforestation of openings (either by natural succession or by plantings of native species) that are not otherwise serving another priority habitat need.
- Incorporate this habitat type in landbird point count surveys, migration and winter bird counts, and anuran call counts. Update the landbird point count habitat classification to track changes in forest habitat relative to bird habitat use.

Within 5 years of CCP approval:

- Identify areas where natural hydrology has been interrupted or diverted and has the potential for restoration through removal of drain tiles, plugging drainage ditches, etc. Once natural hydrology has been restored, allow these areas to revert naturally to hardwood bottomland forest.

Monitoring Elements

- Conduct appropriate monitoring and survey programs as funding and staffing permits to measure our success with respect to our means and fundamental objectives. The results may trigger adjustments to management strategies, to achieve structural and species diversity or improve forest health, or results may trigger a re-evaluation or refinement of our objectives. Examples of monitoring or surveys that we may implement include:
 - Continue to map and scout for the presence of disease, nuisance species, invasive plants, or any other threats to forest health.
 - Continue to incorporate this habitat type into ongoing biological surveys, such as the habitat-based landbird point count surveys, winter or summer bald eagle surveys in riparian areas, migration and winter bird counts, and anuran call counts. Landbird point count habitat classifications in hardwood bottomland forests would be updated to track changes in habitat relative to bird habitat use.

Rationale

We describe our rationale for managing large, contiguous forests under objective 1.7.

Hardwood bottomland is defined as a low-lying, semi-permanently flooded forest that is not directly influenced by the river. Healthy stands support a rich biodiversity of wildlife and plants native to the area. As we acquire that forest type in the future, especially in areas where it has not been managed previously, such as in streamside forests or hardwood and laurel thickets on cool ravine slopes, those areas will provide long-term, high-quality habitat for numerous priority bird species, such as the prothonotary warbler, Louisiana waterthrush, Swainson's warbler (a significant possible breeder), worm-eating warbler, red-headed woodpecker, wood duck, and rusty blackbird, and other taxa such as the spotted turtle, amphibians (salamanders, frogs, toads), invertebrates, and rare plant communities.

Objective 1.9 Loblolly Pine Forest

Within the next 15 years, on 1,771 acres of loblolly pine forest, maintain the integrity of mature stands, and enhance the structural and species diversity in any younger overstocked monotypical stands, e.g. 1000 trees per acre (or 10 per 20 feet×20 feet) and in patches greater than 5 acres, to benefit a variety of canopy-, midstory-, and understory-breeding forest-dependent birds identified in the BCR 30 plan and the VA WAP, such as northern bobwhite and chuck-will's widow.

Strategies

Within 5 years of CCP approval:

- Increase the structural and species diversity in overstocked monotypical stands of loblolly pine, e.g. 1,000 trees per acre (or 10 per 20 feet×20 feet) and in patches greater than 5 acres.
 - Conduct stand inventories for potential areas needing restoration or management; incorporate prescriptions and implementation strategies in the HMP and AHWP as appropriate. Continue to map and scout for the presence of disease, nuisance species, invasive plants, or any other threats to forest health.
 - Perform early detection and rapid response control of invasive, undesirable plants, pathogens, and animal species, and diseases.
 - Use pre-commercial mechanical and selective thinning, ensuring minimal disturbance impacts (soil erosion and compaction, introduction of non-native invasive plants, and fragmentation). Thin such stands using pre-commercial mechanical or selective thinning down to a range between 150 and 200 trees per acre (depending upon basal areas, slope, exposure, and surrounding shelter).
 - Implement standard operating procedures approved by the VA SHPO to avoid damaging potential historic or archeological resources during forest management.

Monitoring Elements

- Conduct appropriate monitoring and survey programs as funding and staffing permits to measure our success with respect to our means and fundamental objectives. The results may trigger adjustments to management strategies, to achieve structural and species diversity or improve forest health, or results may trigger a re-evaluation or refinement of our objectives. Examples of monitoring or surveys that we may implement include:
 - Continue to map and scout for the presence of disease, nuisance species, invasive plants, or any other threats to forest health.
 - Continue to incorporate this habitat type into ongoing biological surveys, such as the habitat-based landbird point count surveys, winter or summer bald eagle surveys in riparian areas, migration and winter bird counts, and anuran call counts. Landbird point count habitat classifications near overstocked pine or hardwood forest types would be updated to track changes in habitat relative to bird habitat use, particularly after such stands undergo improvement measures such as thinning, prescribed fire, etc.

Rationale

Forests are a significant habitat type in the refuge acquisition boundary (see the rationale for objectives 1.7 and 1.8). Nearly all of the forest in this area has been highly altered. Short-rotation pine plantations and hardwood harvesting have been major economic activities on the eastern Virginia landscape for generations. The refuge includes a number of relict pine stands, which were either planted or are regenerating naturally from seed, and hardwood forest regenerating from previous clear-cuts. Regenerating pine often contain patches of overstocked, monotypical, or early successional growth with no understory. Except for a few species, these stands are generally poor habitats for the majority of breeding birds or migrants in this region (CCB 2002), and may pose a fire hazard in drought years.

Stands less than 5 acres in size generally would not be economically feasible for commercial thinning operations. Improvements to regenerating loblolly pine stands would benefit breeding pine forest species such as eastern screech owl, northern bobwhite, pine warbler, chuck-will's widow, and wintering brown creeper;

kinglets, and pine siskin. Stand improvements would also apply to overstocked forested tracts acquired by the Service in the future.

The highly altered state of some pine stands makes type classification challenging. For example, many stands classed as pine by forestry professionals actually have sufficient stocking of hardwoods to support bird communities typical of mixed pine-hardwood stands (Hamel 1992). In addition, mixed pine-hardwood stands on the Coastal Plain bottomlands differ from the same type on higher ground in their species composition and avifauna assemblage (Hamel 1992). Pine forests on the refuge generally fall into the mixed pine-hardwood type. Stands that may appear to be “pure” loblolly on maps or from a distance, upon scrutiny shows evidence of succession toward mixed pine-hardwood containing eastern red cedar, oaks, and shrub layers. Similarly, in the dense, monotypical stands of tulip-poplar, self-thinning and succession toward mixed hardwood types is apparent (Sandy Spencer, personal observation).

The intent of this objective is to assist in the natural succession of highly altered pine and hardwood stands toward a mixed pine-hardwood, or mixed hardwood forest, typical for this region, and provide more structural diversity within each type. In particular, we would promote those stands that contain mast-bearing canopy species such oaks, beech, hickories, and fruit-bearing sub-canopy species, such as viburnums, holly, blueberry, paw-paw, dogwood, mountain laurel.

GOAL 2:

Maintain the long-term biological integrity of the riparian habitat along the Rappahannock River and its tributaries for bald eagles and other migratory birds and resident wildlife

Objective 2.1 Riparian Habitat

Within the next 15 years, protect the existing 1,360 acres of riparian habitat on the refuge, and restore to native vegetation up to 200 additional acres of agricultural land within the riparian area on the Tayloe tract. Management actions would emphasize long-term benefits to species of conservation concern that utilize riparian areas identified in the BCR 30 plan and VA WAP including nesting bald eagles and other migratory birds, amphibians, and reptiles including the state-listed spotted turtle. Riparian protection and restoration would also improve water quality to enhance habitat for fish nurseries and other aquatic life.

Strategies

Continue to:

- On Service-owned lands, widen vegetated riparian buffers to 330 feet or more, and seek opportunities to connect disjunctive vegetation buffers and connect core areas through planting of native trees, grasses or forbs, and through natural succession. Promote native vegetation composition and structure to facilitate ecological function and the biological needs of focal species and the diversity of taxonomic groups using this habitat type.
- Perform early detection and rapid response control of invasive, undesirable plants, pathogens, and animal species, and diseases.
- Acquire riparian habitat, in fee or easement, as a priority from willing sellers when opportunities arise and funding allows. In particular, seek quality riparian habitat in proximity to existing refuge lands.

Within 5 years of CCP approval:

- Evaluate locations where the widths of existing riparian vegetation cover or future acquisitions can be converted to forest (first choice) or native grasses and forbs and expanded to 1,600 feet to maintain for a complete avian community and to benefit herpetofauna. At the very least, the 330 feet minimum width is important to reduce nest predation on breeding birds and provide minimal protection to water quality. Exceptions to allow narrower widths may be necessary to accommodate other land use priorities or site configuration, but will be determined on a site-specific basis.

Monitoring Elements

- Conduct appropriate monitoring and survey programs as funding and staffing permits to measure our success with respect to our means and fundamental objectives. The results may trigger adjustments to management strategies, to achieve structural and species diversity or improve forest health, or results may trigger a re-evaluation or refinement of our objectives. Examples of monitoring or surveys that we may implement include:
 - Continue to map and scout for the presence of disease, nuisance species, invasive plants, or any other threats to forest health.
 - Continue to incorporate this habitat type into ongoing biological surveys, such as the habitat-based landbird point count surveys, winter or summer bald eagle surveys in riparian areas, migration and winter bird counts, and anuran call counts. Landbird point count habitat classifications in riparian forests would be updated to track changes in habitat relative to bird habitat use.
 - Monitor riparian buffers on easement lands to locate problems such as invasive species, erosion, and continue to work with landowners to maintain or enhance the forest buffer's function. Find solutions to address problems encountered.

Rationale

We define riparian habitat as upland vegetation, typically forested, which occurs within a minimum of 330 feet of open water in rivers and creeks, or marsh habitat. In determining the potential for riparian habitat within the entire refuge acquisition boundary, from Port Royal to Lancaster Creek, we used aerial photos to measure the miles of shoreline associated with the river, its tributary creeks, and the edge of marsh habitat. We calculated that 443 miles of shoreline lie in the refuge acquisition boundary: the river contributes 146 miles, and the creeks and marshes 297 miles.¹ The refuge protects 34 miles of shoreline, or about 8 percent of that total.

In translating that shoreline distance to riparian habitat, we estimate that currently there are 1,360 acres of riparian habitat protected by the refuge. This amounts to approximately 8 percent of the total potential riparian area within the entire refuge acquisition boundary.

Protecting the headwaters of rivers and tributary creeks is vitally important to riparian habitat protection and management, and often is viewed as a secondary consideration, after shoreline protection. In our view, both are critical to conserving the overall health and integrity of riparian systems. Clearly, given the amount and distribution of current refuge lands, the refuge's direct role in protecting and conserving riparian areas is somewhat limited within the refuge acquisition boundary. However, we will continue to serve as a resource to local landowners and encourage their voluntary pursuit of riparian conservation measures. We will also continue to work with our conservation partners in implementing education and outreach programs.

Agricultural and timbering land uses, and increasing development interests on the Rappahannock River waterfront, place a high premium on the value of limited high quality riparian habitats. Acquiring and enhancing riparian habitat will therefore be a high priority for the refuge.

Of the three eastern Virginia river tributaries of the Chesapeake Bay: the Rappahannock, York, and James rivers; the Rappahannock River has the lowest

¹ Given the limitations of photo interpretation, our estimate of creek shoreline is probably an underestimate

percentage (35.6 percent) of 30-meter (i.e., 100 feet) buffered shoreline (Dauer et al. 2005). Yet, the area in the refuge acquisition boundary contains one of the most important bald eagle concentration areas in Virginia—one of the primary reasons for establishing the refuge and a focus of its management. Bald eagles are drawn to the area because of the quality riparian habitat supporting nesting and roosting sites close to foraging habitat. They also use trees in riparian habitat as perch sites while feeding and resting. See objective 2.2 for our management proposals directed specifically at bald eagles.

The Northern Neck and Middle Peninsula, the two landmasses that comprise the terrestrial portions of the Rappahannock River Valley, lie directly in the path of migratory birds flying along the western side of the Chesapeake Bay. Augmenting the widths and lengths of riparian habitat will greatly benefit the resting, staging, and stopover needs for migrating birds. Additionally, wider buffers will benefit other forest-dwelling species. Wider buffers, provide greater ecological benefits for wildlife, water quality and aquatic resources. The results of a recent study of 73 wetlands in Canada suggested that the effects of adjacent land-use on wetland sediment and water quality could extend over comparatively large distances (Houlahan and Findlay 2004).

Some frequently recommended or required minimum buffer widths for water quality are 50 feet (Virginia Department of Forestry, Best Management Practices for Water Quality) or 100 feet (Chesapeake Bay Preservation Act). For agriculture, the Natural Resource Conservation Service sets minimum and maximum widths ranging from 30 feet for some herbaceous filter strips, up to 150 feet for forested riparian buffer strips, as part of the Conservation Reserve Program requirements.

Narrow buffer zones between wetlands and more intensive land-uses would not achieve high water quality goals (Houlahan and Findlay 2004). Semlitsch (1998, in Fischer 2000) recommended terrestrial buffers greater than 541 feet to maintain viable populations and communities of salamanders and to maintain the connection between wetlands and terrestrial habitats to preserve the biodiversity of remaining wetlands. The range of recommended widths for birds is broad. Fischer and Fischenich (2000) cite recommendations that range from 50 feet for stopover use during migration, to 330 feet to maintain nesting habitat for area sensitive species of birds, to over 1600 feet to maintain a complete avian community. Wide riparian forests are crucial for bald eagles so that during the heat of the day they can roost in the relatively cooler shade of the deep forest.

Management of easement properties may differ from owned properties to accommodate a balance between landowner's objectives and Service goals. As we negotiate new easements, we will seek to increase riparian habitat by requiring that buffers consisting of native forest or early succession cover types be established and maintained along borders of marsh or waterfront. Mutual agreement between the landowner and the Service will determine the widths and cover types, and permitted forest management activities. If the property is already in forest or a timber tract, we will require the protection of forested buffers along all marsh-front, creek-front, riverfront and major drainages. We would evaluate each new tract for the best width and cover type to ensure maximum riparian benefit yet not conflict with other goals for the property.

Objective 2.2 Bald Eagle Roost and Nest Sites

Over the next 15 years, actively manage all known bald eagle roost and nest sites on refuge lands, which may vary in number and location each year. Prevent disturbance to roosting and nesting birds, ensure no loss or degradation of vegetation supporting known sites, and provide for new and alternative roost and nest sites over the long term.

USFWS



Towing osprey chicks to a new platform

Strategies

Continue to:

- Explore stabilization techniques (such as native plantings of beach grasses, or other means as deemed compatible), as funding and resources permit, to stem erosion of bank and tree loss, in areas of high-energy wave action.
- Use prescribed fire and mechanical thinning techniques to maintain a relative open understory and promote regeneration of future roost trees.
- Incorporate this habitat type in on-going biological surveys, such as habitat-based landbird point count surveys, winter and summer bald eagle surveys, migration and winter bird counts, and anuran call counts. Landbird point count habitat classifications in riparian zones would continue to track changes in riparian vegetation to reflect changes in bird use.
- Observe time-of-year restrictions and primary zone guidelines for any potential disturbance activities in roost areas (as described in the Virginia Bald Eagle Management Guidelines (2007)), and the National Bald Eagle Guidelines (FWS 2007); National Wildlife Federation’s “Bald Eagles in the Chesapeake: a management guide for landowners”, VDGIF Bald Eagle nest management in Virginia, Chesapeake Bay Program’s “Habitat requirements for Chesapeake Bay Living Resources—Bald Eagle”, and USFWS Habitat management guidelines for the bald eagle in the southeast region, 3rd revision).
- Engage in public outreach and education and facilitate opportunities to demonstrate riparian habitat protection on the refuge.
- Work with conservation partners to acquire high conservation-value areas within the focus areas designated in 1994 for protection of bald eagle habitat as identified in the Refuge Establishment Environmental Assessment (1995) and more recent bald eagle surveys, especially if they currently exist as quality riparian habitat or can build upon existing refuge lands.
- Coordinate with VA DGIF when developing plans or activities that might impact bald eagles.

Monitoring Elements

- Conduct appropriate monitoring and survey programs as funding and staffing permits to measure our success with respect to our means and fundamental objectives. The results may trigger adjustments to management strategies, or trigger a re-evaluation or refinement of our objectives. Examples of monitoring or surveys that we may implement include:
 - Monitor changing bald eagle roost and nest use and make modifications or repairs as necessary to ensure the favorable roosting conditions of the site
 - Monitor and control invasive plants, erosion, human disturbance, and other sources of habitat degradation as staff and resources permit to protect the integrity of roost, nest, and concentration areas on refuge property
 - Continue to incorporate this habitat type into ongoing biological surveys, such as habitat-based landbird count surveys, winter and summer bald eagle surveys, migration and winter bird counts, and anuran call counts. Landbird point count habitat classifications in or near roosts would be updated to track changes in habitat relative to bird habitat use.

Rationale

We describe the importance of riparian habitat in objective 2.1 above. Actively managing this habitat type to encourage, sustain, and increase bald eagle roosting and nesting use is one of our highest priorities. Our 1994 EA identified land acquisition focus areas where protecting bald eagle habitat was a priority, and more recent bald eagle surveys conducted on the Rappahannock River by boat and plane have both verified these original areas and identified new ones. We will continue to seek acquisition, in fee or easement, of those lands as a priority, from willing sellers, as opportunities arise and funding is available.

The Rappahannock River Valley is very significant to mid-Atlantic eagle population, and possibly, to the entire eastern population of bald eagles, suggesting the local population has continental importance. It also contains one of the biggest winter concentration areas in the Chesapeake Bay Recovery Area. At one time, 1500–2000 birds (estimate) migrate up from southern states, and 500–600 eagles (estimate) migrate down from northern locations to congregate in the tidal fresh reaches. About 15 percent of all eagles on the East Coast pass through the Rappahannock River area; and, 5 percent of the Chesapeake Bay population nest in the Rappahannock River stretch (120 pairs) (Watts personal communication 2003).

However, due to the status of the Chesapeake Bay as both a summer and winter destination for migrants, concentration areas may support a complex mix of individuals of different ages and from different populations. Sorting out which populations are present, and in which proportions, at any given time is highly problematic. Residency times and turnover rates of birds within concentration areas is also unknown. For that reason, it is not possible to infer how many different individuals may be using particular concentration areas over an extended period (Watts et al. in press).

In Virginia, the bald eagle breeding population has steadily increased from an estimated low of approximately 32 pairs in the late 1960s to 560 known occupied territories in 2007 (Watts and Mitchell 2007). Of that total in 2007, 143 (or approximately 26 percent) were surveyed on the Rappahannock River (Watts and Mitchell 2007). As young eagles mature to breeding age (4–5 years), more suitable nesting sites will be required to maintain positive or stable population trends.

The Chesapeake Bay is an area of convergence for post-nesting and sub-adult bald eagles from breeding populations in the Southeast and Northeast. The

convergence of three geographically distinct populations (northeast, southeast, and Chesapeake Bay) suggests that the bay plays a particularly important role in the recovery of bald eagles in eastern North America. Bald eagle “concentration areas” are locations where eagles congregate in numbers much higher than what may be accounted for by local breeding pairs and their offspring and that support one to several communal roosts. Concentration areas may support a complex mix of individuals of different ages, from different populations, and varying residency times and turnover rates, making it difficult to determine the total number of individual birds for a length of time (Watts et al. in press). Some indication of that quantity is suggested by the periodic, one-day concentration area surveys conducted by boat on Virginia’s three major concentration areas: the James River, Potomac River, and Rappahannock River. The Rappahannock River Concentration Area typically supports the highest number of wintering eagles, with a high winter count in 2005 of 395, but the 9-year average is about 200. Summer surveys began in 2006 and thus far, the high count is 174 on a single survey (Cooper, Portlock and Spencer 2005).

Waterfowl concentration areas are often correlated with fisheries concentration areas. Mid-winter eagle concentrations probably are attracted to concentrations of fish or waterfowl. The high count of eagles in 2005 may have been tied to a die-off of gizzard shad. Most fish runs are not in full swing when the eagles are at their highest densities. The eagles are probably following waterfowl; eagles from the north are known to follow waterfowl south.

Bald eagle communal roost sites have certain characteristics, for which we will manage. Most sites are close to major foraging areas, isolated from human disturbance, protected from harsh weather, surrounded by forest, and usually have a clear movement corridor between the roost and primary foraging areas. Substrates include both pines and hardwoods typically composed of mature canopy trees that possess ample lateral branches for perching and feeding. Actual roost trees tend to be large with good crown access for entry and exit (Watts et al. in press). They tend to occur in wide (>100 feet) forested zones along creeks and rivers (Cline 1993). Nest sites in this area are predominately in pine, but other tree species are used on occasion, such as beech and sycamore (Spencer, personal observation). Although bald eagles retain some fidelity to roosting sites, these sites can also shift due to fluctuations in populations, prey base, changes in surrounding vegetation, and season. For that reason, it is desirable to provide and protect many sites at different locations to account for those potential fluctuations.

Nest trees are typically a large canopy species towering over the surrounding trees as this affords wide views and easy access for such a wide-winged bird. Typically, the nest tree is one of the largest canopy trees in a clump of trees with little or no undergrowth. The nest tree or clump is usually at the forest edge overlooking a field, marsh, or water body, and never far from feeding habitats (Watts et al. in press, Cline 1993).

We are particularly concerned with the loss of bald eagle sites due to erosion. In addition to making provisions to protect riparian zones from the upland side, the protection of riparian areas from the river or creek-side is also very important. We are observing modest- to high-energy wave action causing calving and undercutting of some banks, and the loss of beaches and roost trees. We speculate that the erosion rate in some places may be 1–2 feet per year. An adjacent landowner claims that 50 feet of beach and marsh have eroded in the past 50 years (Meyers France, January 2007, personal communication). On the Wilna tract, for example, wave action and erosion have affected a 5-acre bald eagle roost site dominated by 35- to 50-year-old loblolly pine and older oaks. We will monitor that situation, and conduct restoration projects as warranted. Raptors, migratory songbirds, great blue herons, and ospreys also use that forested habitat.

We will continue to increase our outreach to boaters and other river users, who are engaged in activities near bald eagle nest or roost sites, in an effort to explain our restrictions in public use and access. Other outreach activities will include programs and field visits to demonstrate our riparian habitat protection and enhancement on the refuge.

GOAL 3:

Maintain and enhance the biological diversity and environmental health of tidal and non-tidal wetlands to benefit Federal-listed species, waterfowl and other migratory birds, fish and shellfish, reptiles and amphibians

Objective 3.1 General Wetlands Protection

Within the next 15 years, protect and enhance the present 1,270 acres of refuge wetlands and seek opportunities to create large-block wetlands (>50 acres) within the refuge boundary as opportunities arise to benefit highest priority species identified in the BCR 30 Plan and VA WAP, such as the bald eagle, sensitive joint-vetch (a Federal-listed plant) and wintering waterfowl such as the black duck. In emergent fresh and brackish marshes, such species as Coastal Plain swamp sparrow, seaside sparrow, marsh wren, king rail, and least bittern would be priorities for management. In tidal freshwater swamps, Louisiana waterthrush and prothonotary warbler would be priorities. In interior marshes and feeder streams, our priorities would include the mud sunfish, alewife, American shad, American eel, and Atlantic sturgeon.

Strategies

Continue to:

- Enhance existing forested or early successional vegetated buffers on headwaters of streams and the uplands surrounding wetlands through natural succession or planting of native species to enhance water quality. If the areas of new acquisition lack a minimum 100-foot minimum buffer around wetlands, establish buffers of sufficient width and vegetative cover as a priority to accomplish resource protection goals (case-by-case determination).
- Engage in outreach and public education to increase private landowner awareness and participation in wetland conservation programs.
- Implement the recovery tasks in the Sensitive Joint-Vetch Recovery Plan (USFWS/NE 2005).
 - Survey to locate occurrences using habitat model recommended by Recovery Team.
 - Protect known populations from invasive plants and other threats.
 - Identify threats such as exotic invasive plant species, seed predation by corn earworm and tobacco budworm, water withdrawal, runoff, or significant changes in surrounding land use patterns.
 - Employ adaptive management where feasible (such as controlling invasive species).
 - Encourage waterfront property owners and local planners in the surrounding community to implement the Chesapeake Bay Preservation Act.
- Target wetlands identified in the 1994 focus areas for Service acquisition or partner protection. In particular, prioritize the protection of large wetlands and wetland complexes within the established acquisition boundary of the refuge. Also, protect uplands adjacent to valuable wetlands, and build upon existing tracts of protected wetland or the headlands of creek drainages.

- Eradicate stand-replacing invasive species to the extent possible, incompatible uses, erosion of critical habitats (where feasible), and runoff from adjacent uplands.
- Identify potential sources of turbidity and minimize those originating from refuge lands.

Within 5 years of CCP approval:

- Facilitate partnerships for researching, conducting inventories, and monitoring the refuge that would improve our understanding of its contribution to and responsibility for VA WAP and BCR 30 plan priority wetland birds that BBS or landbird point counts inadequately detect. For example, information would be highly desirable on the prothonotary warbler, Louisiana waterthrush, and secretive marsh species such as least bittern and king rail. In particular, work with partners to develop and implement a habitat-based, targeted monitoring program for forested wetland species to quantify their relative abundance and density.
- Evaluate small creeks to see if fish passage is restricted. In particular, look at places where fabricated dams that are no longer operational are excluding fish passage. Work with partners to remedy fish passage restrictions where practical.
- Submit any proposals for a fish ladder on Wilna Pond to VA DGIF for review. More data may need to be captured to determine if target species reach the dam and whether, therefore, a fish ladder provides any benefit to the aquatic life in the streams and associated ponds.

Monitoring Elements

- Conduct appropriate monitoring and survey programs as funding and staffing permits. The following are all components of how we would measure our success with respect to our means and fundamental objectives, and the results may trigger adjustments to our management strategies, or trigger a reevaluation or revision to our objectives. Examples of monitoring or surveys may include:
 - Scouting for invasive plants, particularly *Phragmites*, to prevent the loss of quality habitat
 - Secretive marshbird surveys and mid-winter waterfowl surveys to evaluate their patterns of habitat use and potential areas for habitat protection or enhancement projects
 - Surveys for forested wetland priority species such as the prothonotary warbler, to evaluate threats to breeding habitat.
 - Monitor the intertidal zone and shoreline erosion rate of critical habitats for marsh birds, bald eagles, or sensitive joint-vetch to evaluate the potential for abatement
 - Monitor wildlife disturbance in sensitive areas

Rationale

One of the establishing purposes of the refuge is to protect and conserve wetlands (Emergency Wetlands Resources Act of 1986, 100 Stat. 3582-91). Eighty percent of America's breeding population and more than 50 percent of its 800 species of protected migratory birds rely on wetlands (Mitsch and Gosselink 1993, citing Wharton et al. 1982). Over 95 percent of the commercially harvested fish and shellfish species are wetland-dependent. Most freshwater fish depend on wetlands for spawning, and anadromous fish rely on them as nurseries for young fry. Wetlands also provide essential ecosystem functions that technology has yet to

rival such as flood mitigation (especially riverine wetlands), storm abatement and filtering and removing nutrients and toxic material. Wetlands also are significant for global cycles of nitrogen, sulfur, methane and carbon dioxide (Mitch and Gosselink 1993).

The Rappahannock River is an important estuarine tributary of the Chesapeake Bay and, conversely, the bay is intrinsic to the character of the tidal Rappahannock River. What tributaries contribute to the bay in terms of sediment loads, nutrients, and other pollutants, will come back to haunt them in time. Indeed, they are doing so now. Dead zones, caused by toxically low levels of oxygen from high levels of nutrients, are spreading upriver (Dauer et al. 2005). The grass shrimp, which needs clean water and is an important fish food, once was abundant in beds of submerged aquatic vegetation (SAV) around Hoskins Creek (Williams 1993), but the Rappahannock River's SAV beds have all but disappeared because of high sediment loads, and with them went a variety of crustaceans and mollusks that thrived there. All vegetation zones along the river—upland buffers, riverine and estuarine wetlands, beach vegetation, and SAV beds—provide an indispensable ecological function by filtering out those loads to deliver cleaner water to the river and bay.

The several distinct types of wetland habitat on the refuge include

- Tidal freshwater emergent marsh (also known as palustrine emergent wetlands);
- Tidal freshwater swamp (also known as tidal forested wetlands, dominated by trees or shrubs);
- Tidal brackish emergent marsh (contains more salt tolerant species than tidal fresh marshes);
- Riparian forested wetlands (along the lowland margins and also known as hardwood bottomlands) which receive only occasional flooding from the river but may annually flood from rains and sheetflow from uplands;
- Wet meadows, ponds, and vernal pools (created by beaver activity occur in the upper reaches of the feeder creeks and drainages. Wet meadows created by surface flow also are scattered throughout lower terraces on the uplands in depressions in poorly drained soils).

The freshwater tidal marshes are composed of emergent vegetation such as wild rice, cattail, big cordgrass, pickerel-weed and arrow arum, and have salinity levels below 0.5 parts per thousand. They host priority birds such as the American black duck, wood duck, mallard, green-winged teal, common snipe, solitary sandpiper, spotted sandpiper, marsh wren, American bittern, least bittern, sora, and king rail. In addition, Forster's tern forages in the associated open waters in summer. Those areas contain most of the important nursery and spawning habitat for several important fish species that, in turn, provide an important food source for herons, eagles, ospreys and fish-eating waterfowl.

The freshwater, tidally influenced forested wetlands or swamps within the refuge acquisition boundary are dominated by green ash, maple, river birch, and sycamore in the canopy, with an occasional occurrence of bald cypress. The vegetation in those wetlands can withstand long periods of saturation of the root zone during the growing season. They support such priority bird species as the Louisiana waterthrush, prothonotary warbler, worm-eating warbler, red-headed woodpecker, and wood duck. Cerulean warblers and Swainson's warblers may use those forested wetlands even more than has been documented. That potential deserves further study.

The forested wetland swamps in upper Cat Point Creek also support a large colony of purple martins, which may be nesting there. Several great blue heron rookeries, bald eagle nest and roost sites, and numerous osprey nests also lie along the interface of those wetlands with riparian habitat. We discuss habitat for those species in more detail in goal 2. Many species of passerines also use those forested wetlands as stopover habitat during migration.

Tidal brackish marsh (part of the estuarine emergent wetland type) varies by soil type, salinity, elevation and geographic location. It forms along tidal tributaries in the transition zone between outer salt marshes and tidal fresh marshes, and often is dominated by big cordgrass. The low marsh is inundated diurnally, and supports grasses and rushes, while the high marsh experiences inundation only irregularly during storms or spring tides and, therefore, often supports scattered shrubs in addition to grasses and rushes. The Island Farm Marsh tract, opposite the Tappahannock, is characteristic of that type and, depending on salinity levels in any year, sometimes supports vegetation such as *Spartina patens* associated more frequently with salt marshes. Some priority species found in the boundary area's brackish marshes are the American black duck, seaside sparrow, coastal plain swamp sparrow, marsh wren, northern pintail, and a rarer migrant or second breeder, sedge wren.

Riparian forests (non-tidal) have shorter periods of flooding and support forest species that are similar to those in upland hardwood forests. For that reason, we discuss the objectives, rationale, and strategies for this community type separately in goal 2.

Baltimore oriole



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Controlling and preventing the spread of invasive plants, particularly common reed or *Phragmites*, is an essential component of wetland protection and management in the Atlantic coastal states. It spreads rapidly, displaces native vegetation and, over time, raises the height of the marsh floor, altering the hydrology of the marsh. That poses a conservation threat to wetland-dependent fish and wildlife species that evolved with the historic vegetative communities that provide food, nest substrate, spawning habitat, or cover at different times in their annual life cycles.

All refuge lands that border wetlands or open water now have at least 100-foot buffers in grassland or forest vegetation, but that is a very small fraction of what needs to be buffered and protected within the entire refuge acquisition boundary.

The Rappahannock River marshes and their associated open water habitats are vitally important for fish resources, wintering and migrating ducks and geese, invertebrates, migrating monarch butterflies, breeding and wintering amphibians and reptiles, and river otters, and are used by a substantial assemblage of Federal- and state-listed birds of conservation concern. Protecting wetlands is fundamental in preserving the food web of the Rappahannock River Valley.

Size is an important criterion in protecting and managing wetlands. Watts et al. (1992) found that marsh area was a good indicator of species richness in all

breeding marsh birds studied. Marsh-dependent birds declined in frequency in marshes between 12 and 25 acres. Large marshes also were rare in the western shore of the Chesapeake Bay study area. Large expanses of freshwater tidal marshes also are in limited supply on the Rappahannock River, and deserve protection. The Virginia DCR has identified extensive freshwater tidal marsh as a significant plant community type (Belden 2002). The brackish and fresh-brackish marshes on the Rappahannock River support colonies of breeding and wintering marsh wrens, a species of high priority in the BCR 30 plan. Because marsh wrens are pseudo-colonial nesters that will not nest in isolation, they require marshes large enough to accommodate multiple male breeding territories (Kale 1965; Picman et al. 1988; Spencer 2000). Marsh wrens breed and winter on the Rappahannock River (Spencer, personal observation).

Protecting large blocks (>50 acres) of all types of wetland habitat in the refuge will improve the success of nesting, foraging, and cover opportunities for emergent-wetland-dependent species, such as the American black duck, seaside sparrow, marsh wren, coastal plain swamp sparrow, mallard, northern pintail, wood duck, least bittern, king rail, sora, common snipe, and green-winged teal, and for forested swamp species such as the prothonotary warbler, Louisiana waterthrush, red-headed woodpecker, and bald eagle, all identified in the BCR 30 plan and the VA WAP.

Sensitive joint-vetch is an annual legume that appears sporadically in freshwater tidal marsh habitat and prefers disturbed edges. The Service has an obligation to benefit that Federal-listed species. Therefore, our playing an active role in tidal marsh conservation is important. Probably most important is to benefit that species by continuing to control *Phragmites*. Spraying *Phragmites* next to sensitive joint-vetch requires extreme caution, typically using hand equipment.

Objective 3.2 Tidal Brackish and Fresh Marsh

Within the next 15 years, protect and manage quality wintering waterfowl habitat in areas known to support wintering waterfowl concentrations as detected from aerial surveys or where there is potential, particularly in larger marsh complexes of >50 acres.

Strategies

Continue to:

- Establish or widen existing forested or early successional vegetated buffers on headwaters of streams and the uplands surrounding wetlands through natural succession or planting of native species to enhance wetland water quality. If 330-foot minimum buffers around wetlands are lacking in new acquisition areas, establish buffers of sufficient widths and vegetative cover as a priority to accomplish resource protection goals (case-by-case determination).
- Acquire or protect through easements larger tracts of tidal marshland (>50 acres) as funding and opportunity permits.

Monitoring Elements

- None planned, except continue to scout and map the presence of invasive plants to identify any threats to habitat quality

Rationale

Quality wintering waterfowl habitat includes a combination of good foraging and secure resting areas in proximity to each other. Marshes containing a combination of high- and low-marsh vegetation and submerged aquatic vegetation (SAV) interspersed by numerous sheltered pools of varying depths, characterize ideal habitat for dabblers and fish resources for divers. In chapter 3, we describe where the SAV beds are located on the Rappahannock River and what surveys we are undertaking to monitor them.

Objective 3.3 Wet Meadows and Vernal Pools

Over the next 15 years, enhance wet meadow and vernal pool habitats to benefit breeding, foraging, and over-wintering wildlife of conservation concern identified in the VA WAP, such as spotted turtle, ribbon snake, and other native reptiles and amphibians.

Strategy

Continue to:

- Manage existing restored refuge wetlands by manipulating water levels to maximize value to breeding amphibians and other wetland-dependent species.
- Manage vegetation through plantings or other techniques, where feasible or needed, to meet the state recommendation of 300-foot to 1,000-foot vegetated buffers around vernal pools or wetlands.
- Protect known vernal pools from drift and runoff from applications of herbicides.

Within 5-10 years of CCP approval:

- Identify areas where removing agricultural drain tiles and plugging ditches can restore the natural hydrology. Within 5 years of CCP approval, develop restoration plans and timelines for implementation.
- Explore protecting vernal pools on private lands by conservation easement, particularly for forested tracts. Work with landowners to include language in the conservation agreements to establish buffers at least 300 feet, and up to 1,000 feet if possible, around vernal pools in forests, remove agricultural drain tiles, and plug ditches to restore natural hydrology.
- In early spring identify and map areas of concentration of amphibians and vernal pools to ensure their conservation and protection.
- Develop partnerships with Northeast Partners in Amphibians and Reptiles Conservation (PARC, soon to publish habitat management guidelines) and the state herpetologists on protecting and managing vernal pools and general measures to protect amphibians.

Monitoring elements

- Continue annual anuran callback surveys

Rationale

Vernal pools are small bodies of standing water that form in the spring from meltwater and are often dry by mid-summer or may even be dry before the end of the spring growing season. Many vernal pools are found in depressions in agricultural areas, but also may be found in woodlots. Wetland vegetation may become established, but usually is dominated by annuals. Wet meadows usually look much like a fallow field except that water-loving grasses and sedges dominate them. They will contain nearly 100 percent vegetative cover with very little or no open water. Surface water is temporary or seasonal and only present during the growing season in the spring. Wet meadows often form a transition zone between aquatic communities and uplands with soils that are often saturated and mucky.

Quality terrestrial habitat in close proximity to vernal pools, ponds, and wet meadows, where no barriers such as roads exist, is also crucial for breeding, foraging, and over-wintering amphibians such as salamanders and frogs with limited overland range distances. Persistence of amphibian populations at breeding ponds also depends upon the amount and proximity of suitable terrestrial habitats (Blossey and Maerz, unpublished; but see Guerry and Hunter 2002; Pope et al. 2000). Wood frogs may need up to 300 feet to accommodate their post-breeding movements (Baldwin et al. 2006), salamanders may need over 500 feet to accommodate the dispersal movements of some species (Semlitsch 1998) and up to 2,600 feet may be required to accommodate migration distances of newts (Johnston 2003).

Several species such as spotted turtle are in rapid decline. After grasslands, vernal pools are the most rapidly declining habitats in the area, with few to no regulations to protect them. Vernal pools must be one-tenth of an acre in size before any regulations apply; and there is no mitigation required unless the pool is half an acre in size (J.D. Kleopfer, personal communication, 2006). Wet meadows, moist soil units, temporary vernal pools, beaver wetlands, and Coastal Plain ponds in the refuge acquisition boundary have variable hydroperiods and species composition depending on landscape context, soils, and surrounding vegetation and thus are not easily classified. Structurally, they may have some emergent vegetation, grasslands and other early successional vegetation, and even trees.

The characteristic vegetation for vernal pools on the refuge is composed of sedges such as woolgrass, rushes, and shrub species such as wax myrtle, groundsel tree, and black willow. Those areas support bird species such as the common yellowthroat, swamp sparrow (winter), willow flycatcher and sedge wren (migration) and are important breeding grounds for amphibians. Fish may also be present. Depending on the expanse and depth of the water, the green heron, pied-billed grebe, and teal may use these wetlands.

Complexes of wet-meadows and vernal pools near grasslands and forests provide suitable year-round habitat for breeding, foraging, and over-wintering amphibians and certain reptiles. The practice of ditching and draining agricultural fields is widespread in this area. Those practices redirect precipitation sheetflow toward existing outlets such as creeks and ponds. The hydrology of many agricultural fields on the refuge was modified in that fashion. This is beneficial to units currently managed as grasslands, but perhaps, at a cost to terrestrial habitat for amphibians, as it resulted in removal of vernal pools and wet meadows that formed in and around the fields.

Invertebrate prey in terrestrial habitats is greater than in areas immediately around the pond perimeter, and after breeding, amphibians depend on these terrestrial habitats for foraging prior to overwintering (Lamoureux et al. 2002; Pope et al. 2000). The provision of vernal pools and wet meadows should be viewed as a necessary complementary component of the refuge grassland and forest management program.

Management and control of non-native invasive plants will also benefit management for amphibians, as these plants can cause significant reductions in invertebrate abundance (Blossey 1999), potentially degrading the value as amphibian foraging sites. Blossey and Maerz (2002, unpublished) found that green frogs failed to gain weight or mass in habitats invaded by Japanese knotweed, compared to those inhabiting non-invaded fields.

Objective 3.4 Shoreline Zone

Within 5 years of CCP approval, begin a program to prevent or substantially reduce the further erosion or disturbance of beaches and marsh edges or fringes which contain protected populations, such as the Federal-listed sensitive joint-vetch, bald eagle roosts, and to benefit species such as nesting turtles, herons, and shorebirds that use this zone for foraging or for access to adjacent riparian or marsh habitats for critical stages of their life cycles.

Strategies

Continue to:

- Plant native aquatic grasses on gradually sloping beaches with species that are appropriate for brackish or fresh zones in this region, such as widgeon grass (*Ruppia maritima*), wild celery (*Valesneria spiralis*), three-squares, and black needlerush (*Romeria americanus*), and explore other stabilization techniques deemed compatible.
- Protect joint-vetch populations as described in the strategies for objective 3.1.

- Engage in public outreach and education to explain the sensitive nature of these transitional habitats and the importance of reducing human disturbance.
- Manage public use in these areas to ensure compatibility of visitor's activities, especially during sensitive times of the year for wildlife.

Within 5 years of CCP approval:

- Set markers to identify current baseline for a measure of erosion rate near known or suspected sites of high erosion rates (6 inches to 1 foot per year) in marshes near populations of species of conservation concern.
- After observation for 1 year, identify priority areas in need of abatement measures.

Monitoring Elements

- Conduct appropriate monitoring and survey programs as funding and staffing permits. The following are all components of how we would measure our success with respect to our means and fundamental objectives, and the results may trigger adjustments to our management strategies, or trigger a reevaluation or revision to our objectives. Examples of monitoring or surveys may include:
 - Monitoring and treating invasive plants, particularly *Phragmites*, to prevent unacceptable levels of loss of quality habitat. If the patch sizes of *Phragmites* attain a solid stand (regardless of size) that reasonably can be sprayed or, if it threatens a rare community, initiate appropriate control measures to decrease *Phragmites* to a tolerable level. We may leave untreated any patches that are static or inaccessible by any currently available means until we determine a feasible solution or efficacious method.
 - Secretive marsh bird surveys to evaluate habitat use patterns and potential areas for enhancement projects for focal species. We would use the valuations to identify areas for protection from disturbance (waterfowl), or to develop a decision tool to evaluate potential sites for the creation or improvement of marshbird habitat. Monitoring data may be used to evaluate the effectiveness of these decisions, and then to make better decisions in the future at other sites.
 - Mid-winter waterfowl surveys conducted by the state will help keep refuge staff apprised of patterns of use and distribution throughout marshes in the project area. That information is useful for monitoring declines and increases in state-listed or BCR-listed species, for targeting areas for potential easement or protection. Conduct additional aerial waterfowl surveys, if funding is available, in 5-year intervals.
 - Surveys of priority forested wetland species such as prothonotary warbler. Trends in abundance data would be used to trigger assessments of habitat quality for breeding and potential sources of threats to habitat quality.



Cedar Waxwing

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- Surveys of anurans (frogs or toads), to monitor overall diversity and indications of habitat changes that affect local populations or to evaluate for further vernal pool protection or management.
- Monitoring intertidal zone and shoreline erosion rate of critical habitats for marshbirds, bald eagle roosts, or sensitive joint-vetch to evaluate the potential for abatement.
- Monitor disturbance factors for wildlife in sensitive areas.

Rationale

Managing erosion along the edges of a dynamic tidal river presents a great challenge. Beach and marsh erosion is a dynamic natural process of any river system. Depending on the directional orientation of the wide stretches of the lower Rappahannock River, different beaches are subject to pummeling by storms and long-lasting winds at different times, resulting in sand deposition and beach accretion in some places, sand loss and calving of marsh peat or bank at others. Problems tend to be greatest where sediments are unconsolidated, fetch² is greater than 1 mile, upland areas generate significant runoff or have saturated soils, and adjacent shorelines are hardened with protective structures (MD DNR 2000).

Only in a few locations would it make sense to interfere with this natural process. Increasing shoreline development, revetments, bulkheads (hard shorelines), and removal of vegetation for scenic vistas, creates a greater burden for erosion control and maintaining ecological functions on the Rappahannock River's remaining fringe marshes. In some places, we may need to intervene to stem erosion along emergent fringe marshes and beachfronts of other wetland types containing populations of protected or listed species such as the Federal-listed sensitive joint-vetch. The creation of "living shorelines"—planting native aquatic grasses or other vegetation—may partially resolve erosion on gently sloped beaches and shoreline. Cutbank areas with steep drop-offs do not lend themselves to that type of restoration, and may require structures or hybrid solutions. Establishing native vegetation is also a strategy to prevent the establishment of non-native species (Smart, Dick, and Doyle 1998).

GOAL 4:

Promote enjoyment and stewardship of our Nation's natural resources by providing quality, wildlife-dependent recreation and education opportunities on refuge lands and waters.

Objective 4.1 Deer Hunting

Continue to provide a quality annual deer hunt to manage the white-tailed deer population, protect habitat, and provide a priority, wildlife-dependent recreational opportunity on the Wilna, Wright, Tayloe, Hutchinson, Thomas, Port Royal, Toby's Point, Mothershead, and Laurel Grove tracts. Within 15 years of CCP approval, evaluate other existing refuge tracts where hunting is not currently allowed, as well as any new tracts acquired, for new deer hunting opportunities. Where we determine a deer hunt is appropriate, compatible, and can be supported with available resources, we would increase available hunt acres.

Strategies

Continue to:

- Implement the annual lottery, permit-based hunt program. (See additional program details in "Visitor Services Resources—Priority Public Uses" in chapter 3.)

² Fetch is the distance of open water over which wind can form waves.

- Distribute annual special use permits to area dog owners, permitting access to retrieve trespass dogs during the deer hunt season. Continue to annually evaluate the program and make improvements when necessary.
- Obtain data from the VDGIF assessment of the health of the Northern Neck/Middle Peninsula deer populations and adjust the hunt program accordingly to assist in cooperative population management.
- Work with the Friends group, volunteers, and other partners to implement this program.

Within 5 years of CCP approval:

- Work with the VDGIF to improve the reporting system to better facilitate evaluation of the refuge program.
- Evaluate the program through staff observation and hunter contacts.
- Create and maintain access roads or parking areas as needed.
- Coordinate with state and other partners to develop host programs that encourage new user groups, e.g., Becoming an Outdoors Woman, youth hunts.

Rationale

We recognize hunting as a healthy, traditional outdoor pastime, deeply rooted in our American heritage. President Bush recognized this tradition in implementing Executive Order #13443, issued in August 2007, directing the Service and other land management agencies “...to manage wildlife and wildlife habitats on public lands in a manner that expands and enhances hunting opportunities, including through the use of hunting in wildlife management planning.”

In addition, deer hunting aids statewide efforts to control deer populations and complements habitat management on the refuge. Using data collected by the VDGIF and their statewide population analysis, the refuge extrapolates population estimates and adjusts refuge program goals annually, if needed. As in all refuge programs, we make special accommodations upon request, whenever possible, to further facilitate accessibility. The following are the guiding principles of our hunting program, according to new Service policy (605 FW 2).

- 1) Manage wildlife populations consistent with Refuge System-specific management plans approved after 1997 and, to the extent practicable, state fish and wildlife conservation plans.
- 2) Promote visitor understanding of and increase visitor appreciation for America’s natural resources.
- 3) Provide opportunities for quality recreational and educational experiences.
- 4) Encourage participation in this tradition.
- 5) Minimize conflicts with visitors participating in other compatible, wildlife-dependent recreation.

In 2002, we issued a final “Refuge Hunt Plan” and environmental assessment after a 30-day period of public review and comment. The refuge hunt program conforms to state regulations and additional refuge regulations stipulated in Title 50 of the Code of Federal Regulations. Given our stated hunt program objectives, we intend to maintain the deer population at a level commensurate with available habitat, to maintain the health of the herd and prevent the habitat degradation that accompanies overpopulation.

Due to the unpredictable nature of the land acquisition program, we do not know where additional huntable acres will be located, but we intend to open new tracts to deer hunting where we determine it an appropriate and compatible use.

Our highest priorities over the next 15 years would be to continue to develop a quality hunting opportunity for deer, and to evaluate hunting opportunities for waterfowl (see objective 4.2) and wild turkey (see objective 4.3). However, over the next 15 years, and assuming resources and support are available and we have made progress on evaluating the waterfowl and turkey hunts, a secondary priority would be to evaluate opportunities for small game hunting, such as for rabbit and squirrels. Existing refuge tracts provide good habitat for these species and we would expect to acquire additional quality habitat in the future. We would continue to coordinate with VDGIF in evaluating any proposed new hunting and fishing programs.

Summer tanager



Objective 4.2 Waterfowl Hunting

Within 5 years of CCP approval, evaluate establishing a quality public waterfowl hunt program, in partnership with the VDGIF, on refuge tracts such as the Tayloe, Island Farm, and Toby's Point tracts. Expand this opportunity to other existing refuge tracts and newly acquired tracts where determined appropriate and compatible.

Strategies

Within 5 years of CCP approval:

- Evaluate the potential to open the refuge to waterfowl hunting, prepare necessary National Environmental Policy Act (NEPA) documents and management plan, gain state concurrence, ensure compatibility, and consult with the public during the process.
- If the evaluation finds that waterfowl hunting is a compatible use of the refuge:
 - Develop a waterfowl hunt program that ensures high quality resting and feeding habitat are maintained and protected.
 - Work with the VDGIF to determine hunt blind locations where quality waterfowl hunting opportunities exist.
 - Work with the VDGIF to install and maintain stakes to designate waterfowl hunting blinds.

- Within the VDGIF state seasons, determine refuge hunt dates with a focus on minimizing conflicts between hunting, habitat management, and other wildlife-dependent recreational activities.
- Work with the VDGIF annually to evaluate the status and trend of the waterfowl population and adjust the program according to state regulations and the Federal framework.
- Create the necessary infrastructure to support the program, including working with off-refuge partners.
- Collaborate with the VDGIF on waterfowl hunting outreach and enforcement.
- Work with partners such as Ducks Unlimited to provide youth waterfowl hunting opportunities on the refuge, and youth conservation (Greenwing) events.

Rationale

The Refuge Improvement Act identifies hunting as priority wildlife-dependent recreation. The act states, “compatible wildlife-dependent recreation is a legitimate and appropriate general public use of the System.” Furthermore, hunting is an established, traditional use in the local area. We may offer waterfowl hunting on the refuge if determined appropriate and compatible for the refuge; however, we would strive to distribute this use in a way that ensures the continued use of refuge habitats by other visitors with minimal disturbance.

The marshlands along the Rappahannock River are important feeding and resting areas for wintering waterfowl and other water-dependent birds. Most of these marshes are privately owned, however, and many have several types of recreation occurring in or around them, such as fishing, crabbing, and waterfowl hunting during the waterfowl-hunting season. Since its establishment, the Service has not exercised its riparian rights to regulate waterfowl hunting on any of the marshes under its ownership. Consequently, licensed hunting blinds have been set in several locations on the edge of, or within, the navigable waterways of some refuge marshes. That is the case, for example, on the Tayloe and Island Farm tracts. Those blinds are legally established; however, neither the frequency of their use by hunters nor the cumulative impacts on the local wintering waterfowl population using those marshes have been assessed.

Hunting around the refuge could have a significant adverse effect on waterfowl populations using the refuge. A study conducted at the Back Bay National Wildlife Refuge showed that mallard subjected to hunting pressure might have developed a conditioned frequent flight response to humans during the hunting season (Laskowski et al. 1993). That behavior may be detrimental because additional flight can increase hunting mortality and energy expenditure. Waterfowl in poor condition from frequent flights that burn critical body fat experience higher natural mortality rates (Haramis et al. 1986, Hepp et al. 1986). Bartelt (1987) found that human disturbance of family groups of Canada geese resulted in their increased hunting mortality. Poor body condition and low lipid reserves (body fat) during winter and the spring migration can affect the reproductive success of waterfowl (Ankney and MacInnes 1978, Raveling 1979, Krapu 1981).

Developing a refuge waterfowl hunting program would give us the opportunity to offer public waterfowl hunting opportunities and lessen the potential for negative impacts on the life cycles of migratory birds by better regulating the disturbance of wintering waterfowl on refuge lands, and providing safe resting and feeding areas throughout the winter. We would do that primarily through the location of blind sites, and by managing the timing, season, and numbers of hunters.

We intend to work with the VDGIF to coordinate a program using numbered stakes to designate the locations of the hunt blinds. That would require additional coordination to insure compliance with state regulations on blinds. Alternatively, we could exercise our riparian rights and erect permanent, stationary shore blinds. With the assistance of the VDGIF, the refuge would allow hunting in accordance with state seasons. We may cease hunting in certain areas after December 15 to afford additional protection to nesting bald eagles.

The tracts identified as potential quality waterfowl hunting sites include the Tayloe, Island Farm, and Toby's Point. Those tracts total approximately 1000 acres of wetland/marsh habitat along the Cat Point Creek and Rappahannock River. Due to the unpredictable nature of the land acquisition program, we do not know where we would locate additional hunting opportunities, but we would evaluate new tracts for waterfowl hunting where we determined it an appropriate and compatible use. The hunting principles for this objective are the same as those in objective 4.1.

Objective 4.3 Wild Turkey Hunting

Within 5 years of CCP approval, evaluate establishing a quality wild turkey hunting program on refuge tracts such as the Tayloe and Toby's Point tracts, in cooperation with the VDGIF. Expand that opportunity to other refuge tracts and newly acquired tracts where we determine it appropriate and compatible.

Strategies

Within 5 years of CCP approval:

- Evaluate the potential to open the refuge to turkey hunting, prepare necessary NEPA documents and management plan, gain state concurrence, ensure compatibility, and consult with the public during the process.
- If the evaluation finds that turkey hunting is an appropriate and compatible use for the refuge:
 - We would then work with the VDGIF to evaluate the state and regional turkey population and trends, adjusting the refuge hunt program accordingly.
 - Establish a turkey hunt program in conjunction with the state hunting seasons in spring or fall, with a focus on minimizing conflicts between hunting, habitat management, migratory bird nesting, and other wildlife-dependent recreation activities.
 - Work with partners such as the National Wild Turkey Federation to provide youth hunting opportunities and and youth conservation (JAKES) events on the refuge.

Rationale

We recognize wild turkey hunting as a traditional outdoor pastime. When managed responsibly, it can instill a unique appreciation of wildlife, their behavior, and their habitat needs. If our analysis determines that turkey hunting is appropriate and compatible for the refuge, we would pursue developing this opportunity.

We now identify the Tayloe and Toby's Point tracts as potential sites for quality wild turkey hunting. They consist of mature and early successional forest habitats. Through further evaluation, if we determine to pursue this hunt, we would plan to define hunt areas, and conduct a permitted hunt, holding a lottery to determine successful permittees. We may charge an application fee to offset the cost of conducting the hunt. We would ask the VDGIF and the National Wild Turkey Federation to assist in implementing the turkey hunt during the state hunting seasons. State and refuge law enforcement officers would check hunt tracts to ensure compliance with state and refuge regulations. Due to the unpredictable nature of the land acquisition program, we do not know where additional hunt

opportunities may be located, but our intent is to evaluate new tracts for wild turkey hunting where it is determined to be appropriate and compatible.

The hunting principles identified under the rationale for objective 4.1 are the same for this objective.

Objective 4.4 Recreational Fishing

Within 5 years of CCP approval, provide daily, quality fishing opportunities at Wilna Pond on the Wilna tract, and formally establish three new fishing opportunities and daily fishing access at the Hutchinson, Laurel Grove, and Toby's Point tracts.

Strategies

Continue to:

- Provide daily fishing access at the Wilna Pond. Fishing may be conducted by boat, shoreline, or pier access.
- Maintain accessible fishing pier at Wilna Pond. The pier is closed during environmental education or deer hunting activities. We would post notifications of those dates on the refuge website and on signs at the refuge entrance and at Wilna Pond at least 48 hours before closing the pier. However, it is possible that emergency situations may arise on the refuge resulting in closures not anticipated in advance.
- Maintain parking and boat launch at Wilna Pond to facilitate hand-launch boat fishing access to the Wilna Pond. To accommodate more accessible boat launching, small trailers would be permitted. Posts would be installed to prevent large trailers, which could damage the unimproved launch site, from getting too close to the shoreline. Boats, canoes, and kayaks would still need to be hand-launched but the use of trailers would allow safer access for those unable to secure their watercraft on or in a vehicle.
- Conduct annual Kids' Fishing Day event at Wilna Pond for at least 30 youth, ages 5–15 years. Event includes a Fishing Clinic and hands-on fishing in the Wilna Pond. Partners for this event include the Friends, Office of Fisheries Assistance, VDGIF, Boy Scouts, other youth organizations and private companies.
- Provide visitors with general information on the fishing program and refuge specific regulations through the refuge website, information signs located at Wilna Pond, and the fishing brochure, which is available at the information sign along the refuge entrance road and at the refuge headquarters.
- Work with the Friends Group, volunteers, and other partners to implement and maintain the fishing program.

Within 5 years of CCP approval:

- Improve and maintain access roads and parking areas at Wilna, Hutchinson, and Laurel Grove tracts.
- Formally allow bank fishing on refuge lands at Toby's Point within 100 feet upstream of the King George County's Wilmont Landing boat launch and pier; provide informational signs and brochures containing refuge-specific and state fishing regulations to facilitate this use, in cooperation with the county.
- Work with the Friends group and volunteers to replace the fishing pier at the Hutchinson tract.
- Provide designated shoreline and hand-launch boat fishing access at the Laurel Grove tract, pending results of the baseline report.

- Close sites periodically if necessary to minimize conflicts with visitors participating in other compatible wildlife-dependent recreational activities and other habitat management activities. Post notification of those dates on the refuge website and on signs located at the refuge entrance and tract parking areas at least 48 hours prior to its closure.
- Install fishing regulation information at Hutchinson and Laurel Grove tract parking areas.
- Provide visitors with general information on the fishing program and refuge specific regulations through the refuge website, informational signs located at Wilna Pond, and the fishing brochure. Make the fishing brochure available at the information sign located along the refuge entrance road and at the refuge headquarters.
- Revise the fishing brochure and refuge website to include site-specific information for the Hutchinson, Toby's Point, and Laurel Grove tracts.
- Work with the Friends group and volunteers to implement and maintain the fishing program.
- Publish a version of the revised fishing brochure in Spanish.
- Increase public access to the river with the addition of low impact launch sites in areas that are compatible with refuge goals and objectives—particularly for paddle craft that would not result in noise or wake disturbance.
- Consider providing additional non-motorized water craft access at the following locations: Laurel Grove Unit (Laurel Grove Pond) and Island Farm Unit.
- Consider public access to the river where it is compatible with refuge objectives and will complement existing gaps in public access.

Rationale

The Refuge Improvement Act identifies fishing as priority wildlife-dependent recreation. The act states, "Compatible wildlife-dependent recreation is a legitimate and appropriate general public use of the System." Fishing promotes public understanding and appreciation of natural resources and their management on all lands and waters in the Refuge System. A free fishing program has been in place on the Wilna tract since 2003.

The Wilna Pond fish community is a self-sustaining population. Refuge-specific regulations are in effect to ensure its health (i.e., largemouth bass catch and release only).

We are not considering stocking fish in refuge ponds. Generally, refuge management focuses on supporting self-sustaining habitats and native or naturalized species populations.

The Improvement Act stipulates, "In administering the System, the Secretary shall...ensure that the biological integrity, diversity, and environmental health of the System are maintained for the benefit of present and future generations of Americans...." One of several Service policies that devolves from that act is in the Service Manual (601 FW 3), "Biological Integrity, Diversity, and Environmental Health."

Part 3.14(f) of that policy states, "We do not introduce species on a refuge outside of their historic range or introduce a species if we determine they were naturally

extirpated, unless such introductions are essential for the survival of the species and prescribed in an endangered species recovery plan, or is essential for the control of an invasive species and prescribed in an integrated pest management plan.”

Based on new policy in 605 FW3 and 4, we strive to follow these guiding principles for the refuge fishing program.

- 1) Effectively maintain healthy and diverse fish communities and aquatic ecosystems by scientific management techniques.
- 2) Promote visitor understanding of, and increase visitor appreciation for, America’s natural resources.
- 3) Provide opportunities for quality recreational and educational experiences consistent with criteria describing quality as defined in chapter 1.
- 4) Encourage participation in this tradition.
- 5) Minimize conflicts with visitors participating in other compatible, wildlife-dependent activities.

We will continue to provide accessible fishing opportunities, with the addition of one new fishing pier and supporting facilities (road access, parking areas) to provide designated shoreline recreational fishing access, at the Laurel Grove and Hutchinson tracts, respectively.

In addition, on the Toby’s Point tract, we will formally allow fishing in an area that anglers have used for many years. Access to that site is provided by the adjacent Wilmont Landing boat launch area and pier, which are owned and maintained by King George County. Essentially, we believe there is little to low impact associated with anglers’ bank fishing from refuge lands, within 100 feet upstream, or north, of the pier. We will work in cooperation with county officials to provide informational signs and brochures containing refuge-specific and state fishing regulations to facilitate this use.

The Hutchinson tract, located in Essex County, will provide access to fishing in the Mount Landing Creek, while the Laurel Grove tract would provide fishing access in an 11-acre freshwater pond. We will remove an existing, dilapidated pier at the Hutchinson tract, and build a new pier, with volunteer and

Singing dickcissel



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Objective 4.5 Wildlife Observation and Photography

grant assistance. At Laurel Grove, shoreline areas will be designated by signage and maintained, correcting any erosion resulting from foot traffic when necessary. In order to maintain overall fish population health, site specific fishing regulations will be set according to the results from the Laurel Grove Pond survey conducted by the Office of Fisheries Assistance, and all state fishing and boating regulations would apply.

Within 5 years of CCP approval, enhance the current wildlife observation and photography program, and create new, quality, self-guiding opportunities by: opening up five additional tracts to daily access (Hutchinson, Tayloe, Laurel Grove, Wellford and Port Royal tracts); creating or completing four additional trails (Hutchinson, Laurel Grove, Tayloe and Wellford tracts); and, constructing up to three additional photography blinds (Wilna, Tayloe and Port Royal tracts). Expand this opportunity to newly acquired tracts where determined appropriate and compatible.

Strategies

Continue to

- Maintain 9.21 miles of public access roads and 2.40 miles of trails that provide access to wildlife observation and photography opportunities.
- Maintain existing benches, overlooks, and pier at the Wilna tract.
- Improve parking areas at Wilna, Hutchinson, and Tayloe tracts.
- Provide daily, sunrise to sunset, access at the Wilna tract on designated roads and trails.
- Provide general information on opportunity availability on the following publications and electronic media: the Friends website, National Park Service Chesapeake Gateways Network website, Virginia Birding and Wildlife Trail website and guidebook, and refuge website and general brochure.
- Complete the trail on Laurel Grove tract in cooperation with volunteers.
- Maintain informational kiosks at Wilna and Tayloe tracts.
- Construct and install informational kiosks with site maps and brochure racks at Hutchinson, Port Royal, and Laurel Grove tracts.
- Coordinate with state partners, the Friends group, Northern Neck Audubon Society, volunteers, and other partners to assist with maintenance of trails and photo blinds and implementation, monitoring, and evaluation of this program.
- Provide opportunities for expert-led bird or nature walks

Within 5 years of CCP approval:

- Change “Reservation only” to “Open daily,” on signs, websites, and refuge brochures for tracts to be open to daily use.
- Maintain roads and parking areas to provide year-round access to affected tracts.
- Construct and install photography blind on the Wilna Creek Trail in cooperation with the Northern Neck Audubon Society.
- Construct and install a wildlife observation footpath and a photography blind on the Port Royal tract.

- Provide wildlife observation and photography opportunities on newly acquired lands, provided those opportunities would be compatible with refuge natural resources priorities. Our highest priority would be to provide opportunities on those lands that offer a unique refuge experience or provide access to different geographic or habitat areas within the acquisition boundary with minimal impact on wildlife use, habitat management and other wildlife-dependent recreation activities.
- Construct a small (4-5 vehicle) parking lot near the entrance to the Wellford Tract from U.S. Route 360 and develop a walking trail to Little Carter Creek for wildlife viewing.
- Develop an unimproved walking trail at the Tayloe tract and construct a photography blind overlooking Cat Point Creek.
- Ensure that all future acquisitions, development, and ecological enhancements contribute to the scenic integrity of the Rappahannock River, a potential scenic river.

Rationale

The Refuge Improvement Act identifies wildlife observation and photography as priority wildlife-dependent recreation. We believe these programs promote public understanding and appreciation of natural resources and their management on all lands and waters in the Refuge System. Pursuant to the policies in 605 FW 4 and 5, we follow these guiding principles for wildlife observation and photography opportunities at the refuge.

- 1) Provide safe, enjoyable, and accessible wildlife viewing and photography opportunities and facilities.
- 2) Promote visitor understanding of, and increase visitor appreciation for, America's natural resources.
- 3) Focus on providing quality recreational and educational opportunities, rather than quantity, consistent with Service criteria describing quality found in 605 FW 1 Part 1.10.
- 4) Minimize conflicts with visitors participating in other compatible, wildlife-dependent recreation.

These opportunities have been provided daily at the Wilna tract, and by reservation at the Hutchinson, Tayloe, Port Royal, and Laurel Grove tracts since 2003. Existing opportunities are available on designated refuge roads, trails, piers, and overlooks as shown on informational signs, refuge brochures, and the refuge website. We will enhance infrastructure and site accessibility to increase these opportunities. Reservation-only sites would be open daily. Additional trails would be created on the Laurel Grove, Tayloe, Wellford and Hutchinson tracts. Those and existing trails would be supplemented with photography blinds. We would plan the location of the trails and blinds to provide visitors with quality viewing opportunities and emphasize minimizing disturbance to wildlife or sensitive plant communities and habitat management activities. Refuge trails and roads would remain open year-round, sunrise to sunset, except as otherwise permitted under a special use or hunt permit. Access to trails is by foot travel.

Due to the unpredictable nature of the land acquisition program, we do not know where additional wildlife observation and photography opportunities would be located, but our intent is to open new tracts to these activities where it is determined to be appropriate and compatible.

Objective 4.6 Environmental Education

Within 10 years of CCP approval, facilitate educator-led environmental education programs on the refuge, to at least five visits per year, by encouraging partnerships with local teachers and others with an environmental education curriculum based on refuge resources.

Strategies

Continue to:

- Facilitate educator-led environmental education programs for public schools, private schools, home-schooled students, scout troops, and other organized education-oriented groups (Master Naturalists). Program details can be seen in chapter 3, “Existing Environment,” “Refuge Visitor Services Program—Priority Wildlife-dependent Recreational Uses.”
- Provide staff or volunteer-led orientations to visiting groups.
- Maintain the Wilna tract outdoor classroom site. Environmental education visits receive priority use of the Wilna Pond fishing pier. Notification is provided to visitors through the refuge website and signs posted on the refuge entrance road and at Wilna Pond.
- Utilize Wilna tract lodge as an indoor classroom. Maintain environmental education materials and supplies available for loan to visiting groups.
- Work with the Friends group and volunteers to maintain and implement the Environmental Education program.
- Seek cooperative partnership with VDGIF Environmental Education coordinator.

Over the next 10 years:

- Work with partners to provide annual educator workshops to familiarize educators with the refuge and its role in migratory bird conservation.
- Expand involvement in Master Naturalists training to the Middle Peninsula Chapter.
- Work with partners and the Friends group to provide outreach to area schools, scouts, and conservation organizations.
- Support partnership grant writing to facilitate partner-led environmental education programs on the refuge.
- Identify and formalize partnerships with other conservation agencies and organizations.

Rationale

In addition to the rationale provided under objective 4.4, the Service is promoting the importance of connecting people, in particular children, with nature. Two Service initiatives: Connecting People with Nature and No Child Left Inside are currently in the early stages of being implemented on the refuge. Scholars and health care professionals are suggesting a link between a loss of connection with the natural world and many physical and mental maladies in our nation’s youth (Louv 2005). We look to our partners, Friends, and/or other volunteers to help us expand our environmental education programs to connect children with nature, and to develop and assist with other priority public uses.

Objective 4.7 On-site Interpretation

Within 10 years of CCP approval, provide up to six informational signs and six pre-scheduled group visits annually at the Wilna, Hutchinson, Tayloe, Port Royal,

Wellford and Laurel Grove tracts. Expand this opportunity to newly acquired tracts where determined appropriate and compatible. These opportunities are also discussed in goal 5.

Strategies

Continue to:

- Maintain three existing informational signs and brochure dispensers at Wilna and Hutchinson tracts.
- Allow and encourage partners to conduct compatible, resource management programs at the refuge.
- Provide staff or volunteer-led interpretive talks and tours; up to six pre-scheduled groups/year.
- Provide informational brochures at existing signs at Wilna and Hutchinson tracts and refuge headquarters.
- Work with state partners, the Friends group, volunteers, and other partners to maintain and implement interpretive programs.
- Install three additional informational signs and brochure dispensers at Tayloe, Port Royal, and Laurel Grove tracts.

Within 5 years of CCP approval:

- Develop interpretive panels for the Tayloe tract to explain (a) the role that farming has traditionally played in wildlife conservation over the past century, and (b) the rationale that supports why refuges have evolved from planting non-native crops to re-establishing native habitats as the best way to benefit fish and wildlife.
- Support efforts of the Friends group to obtain grants and create a canoe interpretive trail and brochure for the Hutchinson tract, Mount Landing Creek.
- In cooperation with the Refuge Friends group, rehabilitate Mount Landing Creek access pier at Hutchinson tract to provide canoe access to the creek.
- Develop and install up to three interpretive panels along the proposed walking path at the Wellford tract that make connections with the Rappahannock Tribe and their ancestral land uses, the Captain John Smith Chesapeake National Historic Trail, and management activities on the property.

Over the next 15 years:

- Construct and install interpretive signs along trails and other interpretive opportunity sites on newly acquired properties, where appropriate and compatible.

Rationale

The Improvement Act identifies wildlife interpretation as priority wildlife-dependent recreation. New FWS policy in 605 FW 7 defines interpretive programs as management tools to accomplish the following.

- 1) Provide opportunities for visitors to become interested in, learn about, and understand natural and cultural resource management and our fish and wildlife conservation history.
- 2) Help visitors understand their role within the natural world.

- 3) Communicate rules and regulations to visitors, thereby promoting understanding and compliance to solve or prevent potential management problems.
- 4) Help us make management decisions and build visitor support by providing insight into management practices.
- 5) Help visitors enjoy quality wildlife experiences on the refuge.

Further, the new policy provides these guiding principles for interpretive programs.

- 1) Relate what is being displayed or described to something within the personality or experience of the visitor to provide meaningful context.
- 2) Reveal key themes and concepts to visitors based on information.
- 3) Inspire and develop curiosity.
- 4) Relate enough of the story to introduce concepts and ideas and pique visitor interest, discussion, and investigation so that visitors will develop their own conclusions.
- 5) Organize activities around theme statements.

We strive to follow those principles, which will serve to enhance visitors' understanding of the area's significant resources, as well as the important role the refuge plays in their conservation.

We would install additional interpretive signage on several refuge tracts as well as newly acquired tracts. Due to the unpredictable nature of the land acquisition program, we do not know where additional interpretive opportunities would be located, but our intent is to provide these opportunities on new tracts where it is determined to be appropriate and compatible.

Objective 4.8 Off-site Interpretation

Within 15 years of CCP approval, provide up to 10 off-site interpretive opportunities annually for civic groups, conservation organizations, and community events on a pre-scheduled basis.

Strategies

Continue to:

- Provide presentations for scheduled meetings of area civic groups and conservation organizations.



Snowy day on the refuge

Carolina Vasconcelos

- Provide refuge specific exhibits for scheduled fairs, festivals, and other community events utilizing interpretive displays.
- Maintain the refuge website to provide information on refuge resources, issues, wildlife, and habitat management highlighting its role in migratory bird conservation.
- Provide informational brochures to local businesses and distribution locations.
- Work with state partners, Friends, volunteers, and other partners to implement and maintain the Interpretation program.

Rationale

Same as in objective 4.7

GOAL 5:

Communicate and collaborate with local communities, Federal and state agencies, and conservation organizations throughout the lower Rappahannock River watershed to promote natural resource conservation and the mission of the National Wildlife Refuge System.

Objective 5.1 Elected Official Outreach

Within 3 years of CCP approval, inform elected officials representing all 7 counties included within the refuge boundary about the refuge purposes, the mission of the Refuge System, recreational and educational opportunities on the refuge, important management activities, and opportunities for collaboration.

Strategies

Continue to:

- Make a personal appearance annually, before the respective board of supervisors of each of the 7 counties to present an update of refuge activities.
- Invite Federal, state, and local elected officials to attend and participate in outreach events on the refuge.
- Invite Federal, state, and local elected officials to attend guided tours of the refuge to display particular accomplishments, view outstanding natural resource areas, demonstrate management activities, and highlight challenges.
- Provide written or personal briefings for members of Congress or their staffs, as needed or as requested, to inform them about important refuge issues

Rationale

It is important that elected officials at all levels of government, as representatives of all American citizens, be informed about the nationally significant contributions of refuge lands toward wildlife conservation and wildlife-dependent recreation. This is true of both potentially controversial issues and the routine achievements toward accomplishing our objectives. If elected leaders are well informed, they can pass on accurate information to constituents who make inquiries. The support of elected officials is integral for the continued funding and delivery of other resources necessary to achieve the goals and objectives of this plan.

Objective 5.2 Community Outreach

Within 5 years of CCP approval, increase community outreach by conducting up to 15 outreach programs or events each year,³ and initiate regular news articles throughout the year to increase community understanding and appreciation of the refuge's significance to natural resource conservation, its contribution to the Refuge System, and to garner additional support for refuge programs.

³ These events are the same ones (not additive), objectives 4.5 and 4.6., and will take place both on- and off-site.

Strategies*Continue to:*

- Issue news releases on significant accomplishments, to advertise special events, and to announce major management initiatives.
- Honor requests for speaking engagements by local community and civic organizations to inform members about refuge purposes and activities.
- Maintain the refuge website to national standards.
- Provide educational workshops on local natural resource topics and encourage citizen science projects.

Rationale

The Rappahannock River Valley is still a relatively new refuge. From the results of a community survey issued in 2006, it appears that many people living in proximity to the refuge are unfamiliar with the refuge mission and purposes. It is important, if we are to be a valued part of the communities we serve, that we communicate often with local citizens. News articles and personal appearances inform our neighbors about what we are doing and why, which we hope will lead to increased understanding, appreciation, and support of our programs. Feedback we receive from these outreach efforts allows us to understand better the issues that are important in our communities, and how our management may affect them.

Objective 5.3 Private Landowner Assistance

Within 5 years of CCP approval, establish a greater role assisting landowners who seek to maintain and improve wildlife habitat on private lands within and adjacent to the refuge boundary.

Strategies*Continue to:*

- Seek additional funding to continue our current *Phragmites* control and other invasive plant initiatives on private land.

Within 5 years of CCP approval:

- Expand our technical assistance capability to assist private landowners on invasive species identification and control, wetland protection, and habitat restoration and management.
- Seek permanent salary and operational funding to establish a position for a private lands biologist to be stationed at the refuge to accomplish this objective. Potential funding sources include grants, contributed funds, the Partners for Fish and Wildlife Program, and USDA cost sharing programs. We may consider filling this position with a temporary or term position only if we cannot secure permanent funding.

Rationale

As a public land management agency, it is very important to us that we are viewed as responsible, helpful and conscientious neighbors. Assisting private landowners makes good business sense as it raises our visibility as an agency and strengthens support for the missions of the Service and the Refuge System. Working to restore degraded habitats throughout the river valley on other ownerships contributes to the conservation of resources the refuge was established to protect. Providing greater habitat connectivity would benefit most mobile species of conservation concern because they would be less prone to extirpation and have flexibility to move should site specific impacts become too great.

The area within the refuge acquisition boundary totals over 250,000 acres. The refuge is authorized to protect up to 20,000 acres. There are many important

habitats in the lower Rappahannock River Valley that will remain in private ownership, even when the refuge acquisition program is complete. The Fish and Wildlife Coordination Act of 1956 (16 U.S.C. 661) and the Fish and Wildlife Act of 1956 (16 U.S.C. 742a-742j) allow Federal resources to be used on private lands. Using our expertise and resources to assist private landowners will provide more conservation value for fish and wildlife resources of concern, than if we only worked within refuge ownerships. This is particularly true with regard to invasive species control and other habitat restoration projects. Invasive species that are allowed to flourish on private lands can easily spread to refuge lands that may have been previously unaffected. Our efforts to assist private landowners are consistent with the “early detection-rapid response” approach to invasive species control advocated by the Service and its partners.

Our *Phragmites* control and education program, in conjunction with the Rappahannock *Phragmites* Action Committee, is one example of our successes in working with private landowners. We developed an outreach brochure and poster, and collaborated with more than 240 private landowners in controlling hundreds of acres of *Phragmites* along 70 miles of the Rappahannock River. We hope to continue to expand this effort over time to keep that invasive plant from increasing its territory, and to use it as a model to assist landowners in controlling other invasive plants on private lands.

In 2007, we also provided an invasive species workshop for the community, which was well attended. There is interest in expanding these workshops in other parts of the refuge area. We believe that many landowners in the vicinity of the refuge would gladly take on more responsibility in managing their lands to benefit wildlife if they had more assistance in the form of technical advice and a helping hand to get started, whether in controlling invasive species or restoring or enhancing habitat. Current staffing is insufficient to significantly expand our assistance to private landowners, but there are funding sources specifically targeted for improving wildlife habitat on private lands that could be competitively directed to the refuge to implement on-the-ground projects. We will employ innovative methods to structure a new position that draws from all available funding sources to expand our assistance to private landowners.

Objective 5.4 Intergovernmental Partnerships

Within the next 15 years, enhance our existing, and seek additional, collaborative relationships with Federal, state, and local government agencies to fulfill mutual natural resource conservation goals.

Strategies

Continue to:

- Offer office space to the VDGIF through an existing memorandum of agreement, facilitating close collaboration on biological, recreational, and law enforcement programs.
- Collaborate with the Virginia Department of Conservation and Recreation on rare plant and animal, and exemplary plant community conservation, including invasive species control, through an existing cooperative agreement.
- Coordinate land conservation efforts with the U.S. Department of the Army at Fort A.P. Hill through an existing memorandum of understanding.
- Enhance coordination with VA Coastal Zone Management Program and planning district commissions to implement conservation activities of common interest.

- Continue to work closely with VA DGIF to develop specific wildlife and fisheries management strategies, protect listed species and valuable resources, and provide and manage hunting and fishing programs.
- Continue working with VA DGIF and the National Marine Fisheries Service (NMFS) to appropriately manage the Rappahannock River and its tributaries that are designated Anadromous Fish Use Areas and protect them from degradation and coordinate with VA DGIF any time work in these waters and/or their tributaries is necessary.

Within 10 years of CCP approval:

- Coordinate a forum of government agencies operating in the lower Rappahannock River watershed who have natural resource conservation goals to share information and examine opportunities to advance future collaboration and cooperation.

Rationale

There are many other government agencies with offices or installations in the area that have a share in the responsibility to conserve natural resources. Among them are the U.S. Department of the Army at Fort A.P. Hill, National Park Service, Natural Resources Conservation Service, VDGIF, Virginia Department of Conservation and Recreation, planning district commissions, soil and water conservation district commissions, the Tidewater Resource Conservation and Development Council, and others. We work closely with many of those agencies on special projects, sharing expertise and other resources to achieve mutual objectives.

We could achieve an even greater return for the environment if we worked together on a strategic basis. That would involve establishing a forum to share long-term plans such as our CCP, the VA WAP, master plans, and other strategic documents to examine overlapping goals and determine methods to work together toward meeting shared objectives.

Objective 5.5 Local Project Partnerships

Within the next 15 years, enhance our existing partnerships, and seek additional ones, to help us meet our wildlife, habitat, and visitor services objectives.

Strategies

Continue to:

- Support and offer guidance to the Rappahannock Wildlife Refuge Friends organization.
- Expand our efforts, with the help of our Friends Group, as a member of the Chesapeake Bay Gateways Network to highlight the natural bounty of the Chesapeake Bay by applying for Gateways grants and collaborating with other Gateways Network members.
- Collaborate on special projects with existing partners, including the Alliance for the Chesapeake Bay, Friends of the Rappahannock, garden clubs of the Middle Peninsula and Northern Neck, Master Naturalists Program, Northern Neck Audubon Society, Tidewater Resource Conservation and Development Council, Virginia Herpetological Society, Virginia Native Plant Society, Virginia Society of Ornithology, and other organizations with similar missions.

- Collaborate with educational institutions to conduct research and investigations to seek answers to important natural resource issues on the refuge and within the Refuge System and to contribute our basic understanding of important natural resource issues worldwide.
- Coordinate with local and regional partners to develop a “Northern Neck Visitors Guide” that promotes visitor opportunities on the refuge along with other complementary activities in the region.

Rationale

In addition to land conservation partners, we are fortunate to receive support from a variety of other entities. A Refuge Friends group organized in 2004 is growing in stature and effectiveness. We have benefited from many local and statewide organizations whose conservation missions overlap those of the refuge. We look to our recent admission into the Chesapeake Gateways Network to pave the way for more collaboration and grant opportunities. We also have a strong volunteer program, without whose help we would not have completed many of the visitor service facilities we now have.

We must nurture those many partnerships as we seek to expand our role in conservation, education, and recreation in area around the refuge. We also have benefited from targeted research conducted by colleges and universities, among them Virginia Commonwealth University and the College of William and Mary. Research often can answer complex questions on refuge management issues and add to the wealth of scientific knowledge upon which decisions on current and future resource issues will be based.

Chapter 5



Mountain laurel

Consultation and Coordination

- Introduction
- Planning to Protect Land and Resources
- Partners Involved in Refuge Planning
- Contact Information
- Planning Team
- Other Service Program Involvement
- Other Involvement

Introduction

This chapter describes how we engaged others in developing this CCP. In chronological order, it details our efforts to encourage the involvement of the public and conservation partners: other Federal and state agencies, county officials, civic groups, non-government conservation and education organizations, and user groups. It also identifies who contributed in writing the plan or significantly contributed to its contents.

It does not detail the dozens of informal discussions the refuge manager and his staff have had over the last two years where the CCP was a topic of conversation. Those involved a wide range of audiences, including congressional representatives or their staffs, local community leaders and other residents, refuge neighbors, refuge visitors, and other interested individuals. During those discussions, the refuge manager and his staff often would provide an update on our progress and encourage comments and other participation.

According to Service policy, we must review and update our final CCP at least once every 15 years, or sooner, in response to significant new information that would markedly change management direction or, our Director or Regional Director deem it necessary. If so, we will once again announce our revised planning and encourage your participation.

Planning to Protect Land and Resources

Our refuge planning began informally in March 2005 at an initial strategy meeting between the refuge staff and regional office staff. One major outcome of that first meeting was a timetable for accomplishing the major steps in the planning process and determining when and how we should involve others. Please contact the refuge manager for additional details.

- March 17–18, 2005:** Refuge and regional office planning staff meet on the refuge. We draft a vision statement, identify preliminary issues, determine what additional resource information we need to collect and summarize, discuss who should participate on the core planning team and what other experts we should consult to help us address planning issues. We also develop our timetable for the planning process.
- May 23–24, 2005:** Refuge and regional staff meet with a social scientist and economist from the USGS to discuss the possibility of their designing and implementing a survey of the refuge community.
- June 8, 2005:** We write to the state director of the VDGIF, asking that staff in his agency join our core planning team. His response, on July 5, 2005, names four individuals.
- June 13–17, 2005:** We conduct a visitor services station evaluation, which includes discussions with the president of the Rappahannock Wildlife Refuge Friends Group.
- June 23–24, 2005:** The core team meets for the first time with representatives of other Service programs and the VDGIF to discuss the planning process, issues, and ideas for a technical experts' workshop.



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Pipevine swallowtail

September 22, 2005: 25 guests attend the technical experts' workshop, including state and Federal resource agency staff and representatives from the Virginia Institute of Marine Science, the Center for Conservation Biology at the College of William and Mary, the Nature Conservancy, and the Chesapeake Bay Foundation.

Our purpose is to facilitate a discussion to identify potential natural resource priorities for the refuge. The participants identify as priorities bald eagles, migrating and wintering waterfowl, grassland birds, wetlands and their associated aquatic resources, and healthy, diverse habitats free of invasive plants.

November 1, 2005: We publish a Notice of Intent (to prepare a CCP) in the *Federal Register*.

November 2005: We distribute a 1-page newsletter to more than 600 people, organizations and agencies to announce formally the beginning of the planning process and ask if they want to stay on our project mailing list. We also alert people to the three public open houses we would host in December.

December 2005: We distribute a detailed planning newsletter and issues workbook to everyone on the project mailing list. That workbook asks people to respond to questions about their use and enjoyment of the refuge and the issues they would like us to address. We alert people again to the scheduled public open houses, and provide contact information. We receive 32 workbooks in return.

November–December 2005: The “Northern Neck News,” “Rappahannock Times, and “Free Lance” publish articles on the planning process, alert readers to the public meetings, and explain that we highly encourage public involvement.

December 5–8, 2005: We host three open-house meetings in Richmond, Port Royal, and Warsaw, Virginia, having published notices about the meetings in five local and regional newspapers, on radio, in our newsletter and on the Web. Forty-five people attend the meetings.

At each meeting, we present an overview of current refuge management, describe the planning process, and explain how people can get involved. We also share our preliminary vision and goals for the refuge and the issues we already know we need to address. We ask for feedback, and answer any questions about the planning process.

December 2005: We contact both the Virginia Dept of Historic Resources and the Virginia Dept of Environmental Quality to alert them to the planning process and encourage their involvement.

January 2006: We mail the planning newsletter and issues workbook to hunters to whom we have given permits on the refuge. Our intent is to solicit from that specific user group their ideas about refuge planning issues, their interests and preferences, or other comments.

April 2006:	We distribute a planning update newsletter to everyone on our project mailing list, distribute it from the refuge office and at refuge events, and post it on our website. It summarizes what we heard at our public meetings and encourages continued involvement in the planning process.
May to July 2006:	We work with the USGS on conducting a community survey, and send it to a random group of 1,200 residents in our study area. Its purpose is to collect baseline information on issues, characterize visitor services, visitor preferences and experiences, test the favorability of some proposed management actions, and improve our outreach program. Appendix G in the draft CCP/EA contains the executive summary of the survey results.
June 2007:	We distribute a planning update newsletter to everyone on our project mailing list, distribute it from the refuge office and at refuge events, and post it on our website. That newsletter presents highlights of the three management alternatives we would evaluate in detail.
July 2009	Announced the availability of the draft CCP/EA in the <i>Federal Register</i> . Also, we distributed the draft CCP/EA for thirty-five days of public review and comment and held two public meetings to receive comments on the draft CCP/EA.

Partners Involved in Refuge Planning

Refuge programs enjoy a great deal of support from outside the Service in many arenas: conducting biological surveys, enhancing public use and refuge programs, restoring habitat, and protecting land. Our partnerships will continue to expand under the increasing interest in conserving refuge resources. During the past few years, we contacted the following partners to apprise them of the planning process and encourage their involvement.

- Boy Scouts of America
- Center for Conservation Biology at the College of William and Mary
- Chesapeake Bay Foundation
- Conservation Management Institute at Virginia Polytechnic and State University
- Essex County Countryside Alliance
- Fort A.P. Hill (U.S. Army)
- Garden Club of the Middle Peninsula
- Middle Peninsula Land Trust
- National Park Service
- Natural Resources Conservation Service
- Northern Neck Audubon Society
- Northern Neck Land Conservancy

- Northern Neck Soil and Water Conservation District
- Rappahannock *Phragmites* Action Committee
- Rappahannock Wildlife Refuge Friends Group
- Rotary Club
- St Margaret's School
- The Conservation Fund
- The Nature Conservancy
- Three Rivers Soil and Water Conservation District
- Trust for Public Land
- University of Mary Washington—Biology Dept
- Virginia Commonwealth University—Biology Dept
- Virginia Dept of Conservation and Recreation, Natural Heritage Program
- Virginia Dept of Game and Inland Fisheries
- Virginia Farm Bureau
- Virginia Herpetological Society
- Virginia Institute of Marine Science
- Virginia Native Plant Society
- Virginia Ornithological Society
- Virginia Outdoors Foundation

Contact Information

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413-253-8562 telephone
413-253-8468 facsimile
<http://northeast.fws.gov/planning>

Planning Team

Joseph McCauley	<i>Project Leader,</i> Eastern Virginia Rivers Refuge Complex
Kathryn Owens	<i>Deputy Project Leader,</i> Eastern Virginia Rivers Refuge Complex (has since transferred to Back Bay NWR)

Other Service Program Involvement

Sandy Spencer	<i>Refuge Complex Biologist,</i> Eastern Virginia Rivers Refuge Complex
Susan Guiteras	<i>Regional Refuge Biologist,</i> USFWS Refuge System (has since transferred to the Coastal Delaware Refuge Complex)
Julie Study	<i>Regional Visitor Services Specialist,</i> USFWS Refuge System (has since transferred to the National Conservation Training Center)
Susan Lingenfelter	<i>Wildlife Biologist,</i> USFWS Ecological Services Virginia Field Office
Nancy McGarigal	<i>Regional Natural Resource Planner,</i> Planning Team Leader, USFWS Refuge System
John (J.D.) Kleopfer	<i>Wildlife Diversity Biologist/Herpetologist</i> VDGIF, Wildlife Diversity Division
Steve Owens	<i>Fisheries Biologist,</i> VDGIF Fisheries Division
Phil West	<i>Wildlife Biologist,</i> VDGIF Wildlife Division
Galon Hall	<i>District Wildlife Biologist,</i> VDGIF Wildlife Division (has since transferred from the agency)
Andrew Zadnick	<i>Environmental Services Biologist,</i> VDGIF, Wildlife Diversity Division (has since transferred from the agency)
Melanie Steinkamp	<i>Mid Atlantic Coordinator for the Atlantic Coast Joint Venture,</i> USFWS Migratory Birds and State Programs
Bruce (BJ) Richardson	<i>Regional Cartographic and Spatial Data Services Specialist,</i> USFWS Refuge System (has since transferred to the Regional Office—Information and Technology Management Program)
Albert Spells	<i>Coordinator,</i> USFWS Virginia Fisheries Program Office
Carolina Ferro Vasconcelos	<i>Assistant Regional Natural Resource Planner,</i> USFWS Refuge System (has since transferred from the agency)
Lelaina Marin	<i>Assistant Regional Natural Resource Planner,</i> USFWS Refuge System (has since transferred from the agency)
Mao Lin	<i>Assistant Regional Natural Resource Planner,</i> USFWS Refuge System (has since transferred to the Ecological Services—Gulf of Maine program)
Jan Taylor	<i>Regional Refuge Biologist,</i> USFWS Refuge System
Hal Laskowski	<i>Interregional Biological Monitory Coordinator,</i> USFWS Refuge System

Other Involvement

Chris Dwyer	<i>Migratory Bird Coordinator,</i> USFWS Migratory Bird and State Program
Cyrus Brame	<i>Visitor Service Specialist,</i> USFWS Eastern Virginia Rivers Refuge Complex
Scott Klopfer	<i>GIS and Remote Sensing Division Leader,</i> Conservation Management Institute, Virginia Tech (assisted in mapping vegetation)
Natalie Sexton	<i>Social Scientist,</i> USGS Policy and Science Assistance Program, Ft. Collins, CO (developed and coordinated our community survey)
Lynne Koontz	<i>Economist,</i> USGS Policy and Science Assistance Program, Ft. Collins, CO (assisted in developing regional economic profiles and describing economic impacts of the draft CCP/EA alternatives)



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Volunteers constructing the Hutchinson Tract Trail

Glossary



©John Fox

Eastern pondhawk

Glossary (including list of acronyms)

accessibility	the state or quality of being easily approached or entered, particularly as it relates to complying with the Americans With Disabilities Act
accessible facilities	structures accessible for most people with disabilities without assistance; facilities that meet UFAS standards; ADA-accessible [E.g., parking lots, trails, pathways, ramps, picnic and camping areas, restrooms, boating facilities (docks, piers, gangways), fishing facilities, playgrounds, amphitheaters, exhibits, audiovisual programs, and wayside sites.]
adaptation	adjustment to environmental conditions
adaptive management	<p>focuses on learning and adapting, through partnerships of managers, scientists, and other stakeholders who learn together how to create and maintain sustainable ecosystems. -</p> <p>Adaptive management: helps science managers maintain FLEXIBILITY in their decisions, knowing that uncertainties exist and provides managers the latitude to change direction will improve UNDERSTANDING of ecological systems to achieve management objectives is about taking ACTION to improve progress towards desired outcomes. (source: Williams, B. K., R. C. Szaro, and C. D. Shapiro. 2007. Adaptive Management: The U.S. Department of the Interior Technical Guide. Adaptive Management Working Group, U.S. Department of the Interior, Washington, DC.)</p>
advanced regeneration	tree seedlings or small saplings that develop in the understory prior to the removal of the overstory.
aggregate	many parts considered together as a whole
alternative	a reasonable way to fix an identified problem or satisfy a stated need [40 CFR 1500.2 (cf. “management alternative”)]
appropriate use	<p>a proposed or existing use on a refuge that meets at least one of the following three conditions:</p> <ol style="list-style-type: none"> 1. the use is a wildlife-dependent one; 2. the use contributes to fulfilling the refuge purpose(s), the System mission, or goals or objectives described in a refuge management plan approved after October 9, 1997, the date the National Wildlife Refuge System Improvement Act was signed into law; or 3. the use has been determined appropriate as specified in section 1.11 of that act.
approved acquisition boundary	a project boundary that the Director of the U.S. Fish and Wildlife Service approves upon completion of the planning and environmental compliance process. An approved acquisition boundary only design-nates those lands which the Service has authority to acquire or manage through various agreements. The approval of an acquisition boundary does not grant the Service jurisdiction or control over lands within the boundary, and it does not make lands within the refuge boundary part of the National Wildlife Refuge System. Lands do not become part of the System until the Service buys them or they are placed under an agreement that provides for their management as part of the System.
anadromous fish	from the Greek, literally “up-running”; fish that spend a large portion of their life cycle in the ocean and return to freshwater to breed

aquatic	growing in, living in, or dependent upon water
aquatic barrier	any obstruction to fish passage
avian	of or having to do with birds
avifauna	all birds of a given region
barrier	cf. “aquatic barrier”
basin	the land surrounding and draining into a water body (cf. “watershed”)
benthic	living at, in, or associated with structures on the bottom of a body of water
best management practices	land management practices that produce desired results [N.B. Usually describing forestry or agricultural practices effective in reducing non point source pollution, like reseeding skidder trails or not storing manure in a flood plain. In their broader sense, practices that benefit target species.]
biological diversity or biodiversity	the variety of life and its processes and includes the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur
biological integrity	biotic composition, structure, and functioning at genetic, organism, and community levels comparable with historic conditions, including the natural biological processes that shape genomes, organisms and communities
biodiversity conservation	the goal of conservation biology, which is to retain indefinitely as much of the earth’s biodiversity as possible, with emphasis on biotic elements most vulnerable to human impacts
biomass	the total mass or amount of living organisms in a particular area or volume
biota	the plant and animal life of a region
breeding habitat	habitat used by migratory birds or other animals during the breeding season
buffer species	alternate prey species exploited by predators when a more preferred prey is in relatively short supply; i.e., if rabbits are scarce, foxes will exploit more abundant rodent populations
buffer zones	land bordering and protecting critical habitats or water bodies by reducing runoff and nonpoint source pollution loading; areas created or sustained to lessen the negative effects of land development on animals, plants, and their habitats

candidate species	plants and animals for which the U.S. Fish and Wildlife Service (FWS) has sufficient information on their biological status and threats to propose them as endangered or threatened under the Endangered Species Act (ESA), but for which development of a proposed listing regulation is precluded by other higher priority listing activities (Source: http://www.fws.gov/endangered/factsheets/candidate_species.pdf)
canopy	the layer of foliage formed by the crowns of trees in a stand. For stands with trees of different heights, foresters often distinguish among the upper, middle and lower canopy layers. These represent foliage on tall, medium, and short trees. The uppermost layers are called the overstory.
community	the locality in which a group of people resides and shares the same government
community type	a particular assemblage of plants and animals, named for its dominant characteristic
compatible use	“The term ‘compatible use’ means a wildlife-dependent recreational use or any other use of a refuge that, in the sound professional judgment of the Director, will not materially interfere with or detract from the fulfillment of the mission of the System or the purposes of the refuge.”—National Wildlife Refuge System Improvement Act of 1997 [Public Law 105-57; 111 Stat. 1253]
compatibility determination	a required determination for wildlife-dependent recreational uses or any other public uses of a refuge
Comprehensive Conservation Plan	mandated by the 1997 Refuge Improvement Act, a document that provides a description of the desired future conditions and long-range guidance for the project leader to accomplish purposes of the refuge system and the refuge. CCPs establish management direction to achieve refuge purposes. [P.L. 105-57; FWS Manual 602 FW 1.4]
concern	cf. “issue”
conifer	a tree or shrub in the phylum Gymnospermae whose seeds are borne in woody cones. There are 500600 species of living conifers (Norse 1990)
connectivity	community occurrences and reserves have permeable boundaries and thus are subject to inflows and outflows from the surrounding landscape. Connectivity in the selection and design of nature reserves relates to the ability of species to move across the landscape to meet basic habitat requirements. Natural connecting features within the ecoregion may include river channels, riparian corridors, ridgelines, or migratory pathways.
conservation	managing natural resources to prevent loss or waste[N.B. Management actions may include preservation, restoration, and enhancement.]
conservation agreements	written agreements among two or more parties for the purpose of ensuring the survival and welfare of unlisted species of fish and wildlife or their habitats or to achieve other specified conservation goals. Participants voluntarily commit to specific actions that will remove or reduce threats to those species.

conservation easement

a non-possessory interest in real property owned by another imposing limitations or affirmative obligations with the purpose of returning or protecting the property's conservation values.

conservation status

assessment of the status of ecological processes and of the viability of species or populations in an ecoregion.

consultation

a type of stakeholder involvement in which decision makers ask stakeholders to comment on proposed decisions or actions.

cooperative agreement

a usually long-term habitat protection action, which can be modified by either party, in which no property rights are acquired. Lands under a cooperative agreement do not necessarily become part of the National Wildlife Refuge System

cord

an 8-foot-long pile of wood stacked 4 feet high and composed of 4-foot-long pieces.

critical habitat

according to U.S. Federal law, the ecosystems upon which endangered and threatened species depend

cultural resource inventory

a professional study to locate and evaluate evidence of cultural resources within a defined geographic area [N.B. Various levels of inventories may include background literature searches, comprehensive field examinations to identify all exposed physical manifestations of cultural resources, or sample inventories for projecting site distribution and density over a larger area. Evaluating identified cultural resources to determine their eligibility for the National Register follows the criteria in 36 CFR 60.4 (cf. FWS Manual 614 FW 1.7).]

cultural resource overview

a comprehensive document prepared for a field office that discusses, among other things, project prehistory and cultural history, the nature and extent of known cultural resources, previous research, management objectives, resource management conflicts or issues, and a general statement of how program objectives should be met and conflicts resolved [An overview should reference or incorporate information from a field office's background or literature search described in section VIII of the Cultural Resource Management Handbook (FWS Manual 614 FW 1.7).]

database

a collection of data arranged for ease and speed of analysis and retrieval, usually computerized

dbh

(diameter at breast height) — the diameter of the stem of tree measure at breast height (usually 4.5 feet above the ground). The term is commonly used by foresters to describe tree size.

dedicated open space

land to be held as open space forever

degradation

the loss of native species and processes due to human activities such that only certain components of the original biodiversity persist, often including significantly altered natural communities

designated wilderness area	an area designated by Congress as part of the National Wilderness Preservation System [FWS Manual 610 FW 1.5 (draft)]
desired future condition	the qualities of an ecosystem or its components that an organization seeks to develop through its decisions and actions.
digitizing	the process of converting maps into geographically referenced electronic files for a geographic information system (GIS)
distribution pattern	the overall pattern of occurrence for a particular conservation target. In ecoregional planning projects, often referred to as the relative proportion of the target's natural range occurring within a give ecoregion (e.g. endemic, limited, widespread, disjunct, peripheral).
disturbance	any relatively discrete event in time that disrupts ecosystem, community, or population structure and changes resources, substrate availability, or the physical environment
donation	a citizen or group may wish to give land or interests in land to the Service for the benefit of wildlife. Aside from the cost factor, these acquisitions are no different than any other means of land acquisition. Gifts and donations have the same planning requirements as purchases.
easement	a non-possessory interest in real property that permits the holder to use another's land for a specified purpose. It may also impose limitations or affirmative obligations on the holder of the land subject to the easement. An agreement by which landowners give up or sell one of the rights on their property [E.g., landowners may donate rights-of-way across their properties to allow community members access to a river (cf. "conservation easement").]
ecological integrity	native species populations in their historic variety and numbers naturally interacting in naturally structured biotic communities. For communities, integrity is governed by demographics of component species, intactness of landscape-level ecological processes (e.g., natural fire regime), and intactness of internal community processes (e.g., pollination).
ecological land unit (ELU)	mapping units used in large-scale conservation planning projects that are typically defined by two or more environmental variables such as elevation, geological type, and landform (e.g., cliff, stream, summit).
ecological processes	a complex mix of interactions among animals, plants, and their environment that ensures maintenance of an ecosystem's full range of biodiversity. Examples include population and predator-prey dynamics, pollination and seed dispersal, nutrient cycling, migration, and dispersal
ecological process approach	an approach to managing for species communities that manages for ecological process (e.g., flooding, fire, herbivory, predator-prey dynamics) within the natural range of historic variability. This approach assumes that if ecological processes are occurring within their historic range of spatial and temporal variability, then the naturally occurring biological diversity will benefit.

ecological system	Dynamic assemblages of communities that occur together on the landscape at some spatial scale of resolution, are tied together by similar ecological processes, and form a cohesive, distinguishable unit on the ground. Examples are spruce-fir forest, Great Lakes dune and swale complex, Mojave desert riparian shrublands.
ecoregion	a territory defined by a combination of biological, social, and geographic criteria, rather than geopolitical considerations; generally, a system of related, interconnected ecosystems.
ecosystem	a natural community of organisms interacting with its physical environment, regarded as a unit
ecosystem service	a benefit or service provided free by an ecosystem or by the environment, such as clean water, flood mitigation, or groundwater recharge
ecotourism	visits to an area that maintains and preserves natural resources as a basis for promoting its economic growth and development
ecosystem approach	a way of looking at socio economic and environmental information based on the boundaries of ecosystems like watersheds, rather than on geopolitical boundaries
ecosystem based management	an approach to making decisions based on the characteristics of the ecosystem in which a person or thing belongs [N.B. This concept considers interactions among the plants, animals, and physical characteristics of the environment in making decisions about land use or living resource issues.]
edge effect	the phenomenon whereby edge-sensitive species are negatively affected near edges by factors that include edge-generalist species, human influences, and abiotic factors associated with habitat edges. Edge effects are site-specific and factor-specific and have variable depth effects into habitat fragments.
emergent wetland	wetlands dominated by erect, rooted, herbaceous plants
endangered species	a Federal- or State-listed protected species in danger of extinction throughout all or a significant portion of its range
endemic	a species or race native to a particular place and found only there
environment	the sum total of all biological, chemical and physical factors to which organisms are exposed
environmental education	curriculum-based education aimed at producing a citizenry that is knowledgeable about the biophysical environment and its associated problems, aware of how to help solve those problems, and motivated to work toward solving them

environmental health	the composition, structure, and functioning of soil, water, air, and other abiotic features comparable with historic conditions, including the natural abiotic processes that shape the environment
Environmental Assessment	(EA) a public document that discusses the purpose and need for an action, its alternatives, and provides sufficient evidence and analysis of its impacts to determine whether to prepare an environmental impact statement or a finding of no significant impact (q.v.) [cf. 40 CFR 1508.9]
Environmental Impact Statement	(EIS) a detailed, written analysis of the environmental impacts of a proposed action, adverse effects of the project that cannot be avoided, alternative courses of action, short-term uses of the environment versus the maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitment of resources [cf. 40 CFR 1508.11]
euphotic	relating to the upper, well-illuminated zone of a lake where photosynthesis occurs
eutrophic lake	a lake possessing low or a complete absence of oxygen in the deeper portion in midsummer, rich in nutrients and plankton
eutrophication	enrichment of a body of water by the addition of nutrients which stimulate the growth of aquatic plants and may cause a decrease in the organoleptic properties of the water source.
evaluation	examination of how an organization's plans and actions have turned out — and adjusting them for the future.
even-aged	a stand having one age class of trees
exemplary community type	an outstanding example of a particular community type
extinction	the termination of any lineage of organisms, from subspecies to species and higher taxonomic categories from genera to phyla. Extinction can be local, in which one or more populations of a species or other unit vanish but others survive elsewhere, or total (global), in which all the populations vanish (Wilson 1992)
extirpated	status of a species or population that has completely vanished from a given area but that continues to exist in some other location
exotic species	a species that is not native to an area and has been introduced intentionally or unintentionally by humans; not all exotics become successfully established
extant	in biology, a species which is not extinct; still existing
fauna	all animal life associated with a given habitat, country, area or period

federal land	public land owned by the Federal Government, including national forests, national parks, and national wildlife refuges
federal-listed species	a species listed either as endangered, threatened, or a species at risk (formerly, a “candidate species”) under the Endangered Species Act of 1973, as amended
fee-title acquisition	the acquisition of most or all of the rights to a tract of land; a total transfer of property rights with the formal conveyance of a title. While a fee-title acquisition involves most rights to a property, certain rights may be reserved or not purchased, including water rights, mineral rights, or use reservation (e.g., the ability to continue using the land for a specified time period, such as the remainder of the owner’s life).
fen	A type of wetland that accumulates peat deposits. Fens are less acidic than bogs, deriving most of their water from groundwater rich in calcium and magnesium
Finding of No Significant Impact	(FONSI) supported by an environmental assessment, a document that briefly presents why a Federal action will have no significant effect on the human environment, and for which an environmental impact statement, therefore, will not be prepared [40 CFR 1508.13]
fire regime	the characteristic frequency, intensity, and spatial distribution of natural fires within a given ecoregion or habitat
fish passage project	providing a safe passage for fish around a barrier in the upstream or downstream direction
flora	all the plants found in a particular place
floodplain	flat or nearly flat land that may be submerged by floodwaters; a plain built up or in the process of being built up by stream deposition
flyway	any one of several established migration routes of birds
focal species	a species that is indicative of particular conditions in a system (ranging from natural to degraded) and used as a surrogate measure for other species of particular conditions. An element of biodiversity selected as a focus for conservation planning or action. The two principal types of targets in Conservancy planning projects are species and ecological communities.
focus areas	cf. “special focus areas”
forest association	the community described by a group of dominant plant (tree) species occurring together, such as spruce-fir or northern hardwoods
forested land	land dominated by trees [For impacts analysis in CCP’s, we assume all forested land has the potential for occasional harvesting; we assume forested land owned by timber companies is harvested on a more intensive, regular schedule.]

fragmentation	the disruption of extensive habitats into isolated and small patches. Fragmentation has two negative components for biota: the loss of total habitat area; and, the creation of smaller, more isolated patches of habitat remaining.
geographic information system	(GIS) a computerized system to compile, store, analyze and display geographically referenced information E.g., GIS can overlay multiple sets of information on the distribution of a variety of biological and physical features.]
graminoid	grasses and grasslike plants, such as sedges.
grant agreement	the legal instrument used when the principal purpose of the transaction is the transfer of money, property, services, or anything of value to a recipient in order to accomplish a public purpose of support or stimulation authorized by Federal statute and substantial involvement between the Service and the recipient is not anticipated (cf. “cooperative agreement”) (Grants and Cooperative Agreement Act at 31 U.S.C. § 6305)
grassroots conservation organization	any group of concerned citizens who act together to address a conservation need
groundwater	water in the ground that is in the zone of saturation, from which wells and springs and groundwater runoff are supplied
guild	a group of organisms, not necessarily taxonomically related, that are ecologically similar in characteristics such as diet, behavior, or microhabitat preference, or with respect to their ecological role in general
habitat block	a landscape-level variable that assesses the number and extent of blocks of contiguous habitat, taking into account size requirements for populations and ecosystems to function naturally. It is measured here by a habitat-dependent and ecoregion size-dependent system
habitat fragmentation	the breaking up of a specific habitat into smaller, unconnected areas [N.B. A habitat area that is too small may not provide enough space to maintain a breeding population of the species in question.]
habitat conservation	protecting an animal or plant habitat to ensure that the use of that habitat by the animal or plant is not altered or reduced
habitat	the place or type of site where species and species assemblages are typically found and/or successfully reproduce. [N.B. An organism’s habitat must provide all of the basic requirements for life, and should be free of harmful contaminants.]
historic conditions	the composition, structure and functioning of ecosystems resulting from natural processes that we believe, based on sound professional judgement, were present prior to substantial human-related changes to the landscape
hydrologic or flow regime	characteristic fluctuations in river flows

hydrology	the science of waters of the earth: their occurrences, distributions, and circulations; their physical and chemical properties; and their reactions with the environment, including living beings
important fish areas	the aquatic areas identified by private organizations, local, state, and federal agencies that meet the purposes of the Conte Act
impoundment	a body of water, such as a pond, confined by a dam, dike, floodgate, or other barrier, which is used to collect and store water for future use
indicator species	a species used as a gauge for the condition of a particular habitat, community, or ecosystem. A characteristic or surrogate species for a community or ecosystem
indigenous	native to an area
indigenous species	a species that, other than a result as an introduction, historically occurred or currently occurs in a particular ecosystem
interjurisdictional fish	populations of fish that are managed by two or more States or national or tribal governments because of the scope of their geographic distributions or migrations
interpretive facilities	structures that provide information about an event, place, or thing by a variety of means, including printed, audiovisual, or multimedia materials [E.g., kiosks that offer printed materials and audiovisuals, signs, and trail heads.]
interpretive materials	any tool used to provide or clarify information, explain events or things, or increase awareness and understanding of the events or things [E.g., printed materials like brochures, maps or curriculum materials; audio/visual materials like video and audio tapes, films, or slides; and, interactive multimedia materials, CD ROM or other computer technology.]
interpretive materials projects	any cooperative venture that combines financial and staff resources to design, develop, and use tools for increasing the awareness and understanding of events or things related to a refuge
introduced invasive species	non native species that have been introduced into an area and, because of their aggressive growth and lack of natural predators, displace native species
invasive species	an alien species whose introduction causes or is likely to cause economic or environmental harm or harm to human health
inventory	a list of all the assets and liabilities of an organization, including physical, financial, personnel, and procedural aspects.
invertebrate	any animal lacking a backbone or bony segment that encloses the central nerve cord

issue	any unsettled matter that requires a management decision [E.g., a Service initiative, an opportunity, a management problem, a threat to the resources of the unit, a conflict in uses, a public concern, or the presence of an undesirable resource condition.] [N.B. A CCP should document, describe, and analyze issues even if they cannot be resolved during the planning process (FWS Manual 602 FW 1.4).]
Land Protection Plan	(LPP) a document that identifies and prioritizes lands for potential Service acquisition from a willing seller, and also describes other methods of providing protection. Landowners within project boundaries will find this document, which is released with environmental assessments, most useful.
Land trusts	organizations dedicated to conserving land by purchase, donation, or conservation easement from landowners
landform	the physical shape of the land reflecting geologic structure and processes of geomorphology that have sculpted the structure
landscape	A heterogeneous land area composed of a cluster of interacting ecosystems that are repeated in similar form throughout.
landscape approach	an approach to managing for species communities that focuses on landscape patterns rather than processes and manages landscape elements to collectively influence groups of species in a desired direction. This approach assumes that by managing a landscape for its components, the naturally occurring species will persist.
large patch	Communities that form large areas of interrupted cover. Individual occurrences of this community type typically range in size from 50 to 2,000 hectares. Large patch communities are associated with environmental conditions that are more specific than those of matrix communities, and that are less common or less extensive in the landscape. Like matrix communities, large-patch communities are also influenced by large-scale processes, but these tend to be modified by specific site features that influence the community.
late-successional	species, assemblages, structures, and processes associated with mature natural communities that have not experienced significant disturbance for a long time
limiting factor	an environmental limitation that prevents further population growth
limits of acceptable change	a planning and management framework for establishing and maintaining acceptable and appropriate environmental and social conditions in recreation settings
local land	public land owned by local governments, including community or county parks or municipal watersheds
local agencies	generally, municipal governments, regional planning commissions, or conservation groups

long term protection	mechanisms like fee title acquisition, conservation easements, or binding agreements with landowners that ensure land use and land management practices will remain compatible with maintaining species populations over the long term
macroinvertebrates	invertebrates large enough to be seen with the naked eye (e.g., most aquatic insects, snails, and amphipods)
management alternative	a set of objectives and the strategies needed to accomplish each objective [FWS Manual 602 FW 1.4]
management concern	cf. “issue” and “migratory nongame birds of management concern”
management opportunity	cf. “issue”
management plan	a plan that guides future land management practices on a tract [N.B. In the context of an environmental impact statement, management plans may be designed to produce additional wildlife habitat along with primary products like timber or agricultural crops (cf. “cooperative agreement”).]
management strategy	a general approach to meeting unit objectives [N.B. A strategy may be broad, or it may be detailed enough to guide implementation through specific actions, tasks, and projects (FWS Manual 602 FW 1.4).]
marshlands	areas interspersed with open water, emergent vegetation (hydrophytes), and terrestrial vegetation (phreatophytes).
matrix forming (or matrix community)	communities that form extensive and contiguous cover may be categorized as matrix (or matrix-forming) community types. Matrix communities occur on the most extensive landforms and typically have wide ecological tolerances. They may be characterized by a complex mosaic of successional stages resulting from characteristic disturbance processes (e.g. New England northern hardwood-conifer forests). Individual occurrences of the matrix type typically range in size from 2000 to 500,000 hectares. In a typical ecoregion, the aggregate of all matrix communities covers, or historically covered, as much as 75-80% of the natural vegetation of the ecoregion. Matrix community types are often influenced by large-scale processes (e.g., climate patterns, fire), and are important habitat for wide-ranging or large area-dependent fauna, such as large herbivores or birds
mesic soil	sandy-to-clay loams containing moisture-retentive organic matter, well drained (no standing matter)
metapopulation	a network of semi-isolated populations with some level of regular or intermittent migration and gene flow among them, in which individual populations may go extinct but can then be recolonized from other populations.
migratory nongame birds of management concern	species of nongame birds that (a) are believed to have undergone significant population declines; (b) have small or restricted populations; or (c) are dependent upon restricted or vulnerable habitats

mission statement	a succinct statement of the purpose for which the unit was established; its reason for being
mitigation	actions to compensate for the negative effects of a particular project [E.g., wetland mitigation usually restores or enhances a previously damaged wetland or creates a new wetland.]
monoculture	when one species dominates over all other species. It refers to an area that is covered primarily or solely by one plant species. In agriculture and forestry, it refers to the planting of only one crop type or tree species over a large area. Also used to describe dense stands of invasive or exotic plants that have out-competed and excluded native plants.
mosaic	an interconnected patchwork of distinct vegetation types.
National Environmental Policy Act of 1969	(NEPA) requires all Federal agencies to examine the environmental impacts of their actions, incorporate environmental information, and use public participation in planning and implementing environmental actions. [Federal agencies must integrate NEPA with other planning requirements, and prepare appropriate NEPA documents to facilitate better environmental decision-making (cf. 40 CFR 1500).]
National Wildlife Refuge System	(Refuge System) all lands and waters and interests therein administered by the Service as wildlife refuges, wildlife ranges, wildlife management areas, waterfowl production areas, and other areas managed to preserve a national network for the conservation and management of fish, wildlife and plant resources of the United States, for the benefit of present and future generations (National Wildlife Refuge System Improvement Act, 16 USC 668dd).
native	a species that, other than as a result of an introduction, historically occurred or currently occurs in a particular ecosystem
native plant	a plant that has grown in the region since the last glaciation, and occurred before European settlement
natural disturbance event	any natural event that significantly alters the structure, composition, or dynamics of a natural community: e.g., floods, fires, and storms
natural range of variation	a characteristic range of levels, intensities, and periodicities associated with disturbances, population levels, or frequency in undisturbed habitats or communities
niche	the specific part or smallest unit of a habitat occupied by an organism
Neotropical migrant	birds, bats, or invertebrates that seasonally migrate between the Nearctic and Neotropics

**non consumptive,
wild-life-oriented
recreation**

wildlife observation and photography and environmental education and interpretation (cf. “wildlife-oriented recreation”)

non-native species

See “exotic species.”

non point source pollution

a diffuse form of water quality degradation in which wastes are not released at one specific, identifiable point but from a number of points that are spread out and difficult to identify and control (Eckhardt 1998)

nonforested wetlands

wetlands dominated by shrubs or emergent vegetation

nonpoint source

a diffuse form of water quality degradation produced by erosion of land that causes sedimentation of streams, eutrophication from nutrients and pesticides used in agricultural and silvicultural practices, and acid rain resulting from burning fuels that contain sulfur (Lotspeich and Platts 1982)

Notice of Intent

(NOI) an announcement we publish in the *Federal Register* that we will prepare and review an environmental impact statement [40 CFR 1508.22]

objective

cf. “unit objective”

obligate species

a species that must have access to a particular habitat type to persist

occurrence site

a discrete area where a population of a rare species lives or a rare plant community type grows

outdoor education project

any cooperative venture that combines financial and staff resources to develop outdoor education activities like labs, field trips, surveys, monitoring, or sampling

outdoor education

educational activities that take place in an outdoor setting

palustrine wetlands

“The Palustrine system includes all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean derived salts is below 0%.” - Cowardin et al. 1979

**Partners for Wildlife
Program**

a voluntary, cooperative habitat restoration program among the Service, other government agencies, public and private organizations, and private landowners to improve and protect fish and wildlife habitat on private land while leaving it in private ownership

partnership

a contract or agreement among two or more individuals, groups of individuals, organizations, or agencies, in which each agrees to furnish a part of the capital or some service in kind (e.g., labor) for a mutually beneficial enterprise

passive management	protecting, monitoring key resources and conducting baseline inventories to improve our knowledge of the ecosystem
payment in lieu of taxes	cf. Revenue Sharing Act of 1935, Chapter One, Legal Context
point source	a source of pollution that involves discharge of waste from an identifiable point, such as a smokestack or sewage-treatment plant (Eckhardt 1998)
population	an interbreeding group of plants or animals. The entire group of organisms of one species.
population monitoring	assessing the characteristics of populations to ascertain their status and establish trends on their abundance, condition, distribution, or other characteristics
prescribed fire	the application of fire to wildland fuels, either by natural or intentional ignition, to achieve identified land use objectives [FWS Manual 621 FW 1.7]
priority general public use	a compatible wildlife-dependent recreational use of a refuge involving hunting, fishing, wildlife observation and photography, or environmental education and interpretation
private land	land owned by a private individual or group or non-government organization
private organization	any non-government organization
proposed wilderness	an area of the Refuge System that the Secretary of the Interior has recommended to the President for inclusion in the National Wilderness Preservation System
protection	mechanisms like fee title acquisition, conservation easements, or binding agreements with landowners that ensure land use and land management practices will remain compatible with maintaining species populations at a site (cf. “long-term ~”)
public	individuals, organizations, and non-government groups; officials of Federal, State, and local government agencies; Native American tribes, and foreign nations—includes anyone outside the core planning team, those who may or may not have indicated an interest in the issues, and those who do or do not realize that our decisions may affect them
public involvement	offering an opportunity to interested individuals and organizations whom our actions or policies may affect to become informed; soliciting their opinions. We thoroughly study public input, and give it thoughtful consideration in shaping decisions about managing refuges.
public involvement plan	long-term guidance for involving the public in the comprehensive planning process

public land	land owned by the local, State, or Federal Government
rare species	species identified for special management emphasis because of their uncommon occurrence within a watershed
rare community types	plant community types classified as rare by any State program; includes exemplary community types
recharge	refers to water entering an underground aquifer through faults, fractures, or direct absorption
recommended wilderness	areas studied and found suitable for wilderness designation by both the Director (FWS) and Secretary (DOI), and recommended by the President to Congress for inclusion in the National Wilderness System [FWS Manual 610 FW 1.5 (draft)]
Record of Decision	(ROD) a concise public record of a decision by a Federal agency pursuant to NEPA [N.B. A ROD includes: * the decision; * all the alternatives considered; * the environmentally preferable alternative; * a summary of monitoring and enforcement, where applicable, for any mitigation; and, * whether all practical means have been adopted to avoid or minimize environmental harm from the alternative selected (or if not, why not).]
refuge goals	“descriptive, open-ended, and often broad statements of desired future conditions that convey a purpose but do not define measurable units.” (Writing Refuge Management Goals and Objectives: A Handbook, FWS January 2004)
refuge purposes	“the terms ‘purposes of the refuge’ and ‘purposes of each refuge’ mean the purposes specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge subunit.” (National Wildlife Refuge System Improvement Act of 1997)
refuge lands	lands in which the Service holds full interest in fee title or partial interest like an easement
regenerating	establishing a new age class. Silviculture does this in a way that controls the species composition, seedling density, and other characteristics consistent with the landowner’s objectives.
relatively intact	the conservation status category indicating the least possible disruption of ecosystem processes. Natural communities are largely intact, with species and ecosystem processes occurring within their natural ranges of variation.
relatively stable	the conservation status category between vulnerable and relatively intact in which extensive areas of intact habitat remain, but local species declines and disruptions of ecological processes have occurred

restoration	management of a disturbed or degraded habitat that results in the recovery of its original state [E.g., restoration may involve planting native grasses and forbs, removing shrubs, prescribed burning, or reestablishing habitat for native plants and animals on degraded grassland.]
restoration ecology	the process of using ecological principles and experience to return a degraded ecological system to its former or original state
riparian	referring to the interface between freshwater habitats and the terrestrial landscape
riparian forested land	forested land along a stream or river
riparian habitat	habitat along the banks of a stream or river [cf. note above]
riverine	within the active channel of a river or stream
riverine wetlands	generally, all the wetlands and deepwater habitats occurring within a freshwater river channel not dominated by trees, shrubs, or persistent emergents
rotation	the period of time from establishment of an even-aged stand until its maturity
runoff	water from rain, melted snow, or agricultural or landscape irrigation that flows over a land surface into a water body (cf. “urban runoff”)
scale	the magnitude of a region or process. Refers to both spatial size—for example, a (relatively small-scale) patch or a (relatively large-scale) landscape; and a temporal rate—for example, (relatively rapid) ecological succession or (relatively slow) evolutionary speciation
Selection cutting/selection system	The silvicultural system used to regenerate and maintain uneven-aged stands. Selection cuttings are used to remove individual or small groups of mature trees to regenerate a new cohort, as well as to thin the immature age classes to promote their growth and improve their quality.
Service presence	Service programs and facilities that it directs or shares with other organizations; public awareness of the Service as a sole or cooperative provider of programs and facilities
shifting mosaic	an interconnected patchwork of distinct vegetation types that may shift across the land surface as a result of dynamic ecosystem processes, such as periodic wildfire or flooding.
shrublands	habitats dominated by various species of shrubs, often with many grasses and forbs

silviculture	tending and regenerating forest stands to realize sought after benefits and sustain them over time
site improvement	any activity that changes the condition of an existing site to better interpret events, places, or things related to a refuge [E.g., improving safety and access, replacing non-native with native plants, refurbishing footbridges and trailways, and renovating or expanding exhibits.]
small patch	communities that form small, discrete areas of vegetation cover. Individual occurrences of this community type typically range in size from 1 to 50 hectares. Small patch communities occur in very specific ecological settings, such as on specialized landform types or in unusual
microhabitats	the specialized conditions of small patch communities, however, are often dependent on the maintenance of ecological processes in the surrounding matrix and large patch communities. In many ecoregions, small patch communities contain a is proportionately large percentage of the total flora, and also support a specific and restricted set of associated fauna (e.g., invertebrates or herpetofauna) dependent on specialized conditions.
source population	a population in a high-quality habitat where the birth rate greatly exceeds the death rate, and the excess individuals emigrate
spatial pattern	within an ecoregion, natural terrestrial communities may be categorized into three functional groups on the basis of their current or historical patterns of occurrence, as correlated with the distribution and extent of landscape features and ecological processes. These groups are identified as matrix communities, large patch communities, and small patch communities.
special focus area	<p>an area of high biological value [N.B. We normally direct most of our resources to SFA's that were delineated because of: the presence of Federal listed endangered and threatened species, species at risk (formerly, "candidate species"), rare species, concentrations of migrating or wintering waterfowl, or shorebird stopover habitat;</p> <ol style="list-style-type: none">1. their importance as migrant landbird stopover or breeding habitat;2. the presence of unique or rare communities; or3. the presence of important fish habitat.]
special habitats	wetlands, vernal pools, riparian habitat, and unfragmented rivers, forests and grasslands [N.B. Many rare species depend on specialized habitats that, in many cases, are being lost within a watershed.]
special riparian project	restoring, protecting, or enhancing an aquatic environment in a discrete riparian corridor within a special focus area
species	the basic category of biological classification intended to designate a single kind of animal or plant. Any variation among the individuals may be regarded as not affecting the essential sameness which distinguishes them from all other organisms.

species assemblage	the combination of particular species that occur together in a specific location and have a reasonable opportunity to interact with one another
species at risk	A general term referring to species listed under the Endangered Species Act (ESA), as well as for unlisted species that are declining in population. Sometimes the term is used interchangeably with “species of concern”. Such species, unless already listed under ESA, receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing (Source: http://www.fws.gov/endangered/glossary.html).
species of concern	an informal term referring to a species that might be in need of conservation action. This may range from a need for periodic monitoring of populations and threats to the species and its habitat, to the necessity for listing as threatened or endangered under the Endangered Species Act. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing (Source: http://www.fws.gov/endangered/glossary.html).
species diversity	usually synonymous with “species richness,” but may also include the proportional distribution of species
species richness	a simple measure of species diversity calculated as the total number of species in a habitat or community (Fiedler and Jain 1992)
stand	an area of trees with a common set of conditions (e.g., based on age, density, species composition, or other features) that allow a single management treatment throughout
state agencies	natural resource agencies of State governments
stand-replacing species	invasive species that alter entire plant and animal communities by eliminating or sharply reducing populations of native plant and animal species
state land	State-owned public land
state-listed species	cf. “Federal-listed species”
step-down management plan	a plan for dealing with specific refuge management subjects, strategies, and schedules, e.g., cropland, wilderness, and fire [FWS Manual 602 FW 1.4]
stopover habitat	habitat where birds rest and feed during migration
strategy	a specific action, tool, technique, or combination of actions, tools, and techniques for meeting unit objectives
strategic management	the continual process of inventorying, choosing, implementing, and evaluating what an organization should be doing.

stratification	thermal layering of water both in lakes and streams
structure	the horizontal and vertical arrangement of trees and other vegetation having different sizes, resulting in different degrees of canopy layering, tree heights, and diameters within a stand.
succession	the natural, sequential change of species composition of a community in a given area
surface water	all waters whose surface is naturally exposed to the atmosphere, or wells or other collectors directly influenced by surface water
sustainable development	the attempts to meet economic objectives in ways that do not degrade the underlying environmental support system. Note that there is considerable debate over the meaning of this term...we define it as “human activities conducted in a manner that respects the intrinsic value of the natural world, the role of the natural world in human well-being, and the need for humans to live on the income from nature’s capital rather than the capital itself.”
terrestrial	living on land
territory	an area over which an animal or group of animals establishes jurisdiction
thinning	reducing the density of trees in a stand primarily to improve the growth and condition of residual trees and prevent mortality. The term describes treatments in immature even-aged stands that do not attempt to establish regeneration.
threatened species	a Federal-listed, protected species that is likely to become an endangered species in all or a significant portion of its range
tiering	incorporating by reference the general discussions of broad topics in environmental impact statements into narrower statements of environmental analysis by focusing on specific issues [40 CFR 1508.28]
tributary	a stream or river that flows into a larger stream, river, or lake, feeding it water
trust resource	a resource that the Government holds in trust for the people through law or administrative act [N.B. A Federal trust resource is one for which responsibility is given wholly or in part to the Federal Government by law or administrative act. Generally, Federal trust resources are nationally or internationally important no matter where they occur, like endangered species or migratory birds and fish that regularly move across state lines. They also include cultural resources protected by Federal historic preservation laws, and nationally important or threatened habitats, notably wetlands, navigable waters, and public lands like state parks and national wildlife refuges.]
trust responsibility	In the federal government, a special duty required of agencies to hold and manage lands, resources, and funds on behalf of Native American tribes.

turbidity	refers to the extent to which light penetrates a body of water. Turbid waters are those that do not generally support net growth of photo-synthetic organisms
understory	the lower layer of vegetation in a stand, which may include short trees, shrubs, and herbaceous plants
uneven-aged	a stand having three or more age classes of trees with distinctly different ages
unfragmented habitat	large, unbroken blocks of a particular type of habitat
unit objective	desired conditions that must be accomplished to achieve a desired outcome [N.B. Objectives are the basis for determining management strategies, monitoring refuge accomplishments, and measuring their success. Objectives should be attainable, time-specific, and stated quantitatively or qualitatively (FWS Manual 602 FW 1.4).]
upland	dry ground (i.e., other than wetlands)
urban runoff	water from rain, melted snow, or landscape irrigation flowing from city streets and domestic or commercial properties that may carry pollutants into a sewer system or water body
vernal pool	are a type of seasonal wetland formed by isolated depressions in the landscape that hold water in the winter and spring and are usually dry by midsummer or fall. There are no permanent surface connections to flowing water. Water sources include rainfall, snowmelt and elevated water tables. Although fish are usually absent, vernal pools in riparian floodplains may contain fish periodically. Vernal pools are important breeding sites for amphibians. The woody debris and emergent grasses provide attachment sites for egg masses. (source: Mitchell, J.C., A.R. Breisch, and K.A. Buhlmann. 2006. Habitat Management Guidelines for Amphibians and Reptiles of the Northeastern U.S. Partners in Amphibian and Reptile Conservation, Technical Publication HMG-3, Montgomery, Alabama, 108 pp)
vision statement	a concise statement of what the unit could achieve in the next 10 to 15 years
watchable wildlife program	[N.B. A watchable wildlife program is one that helps maintain viable populations of all native fish and wildlife species by building an active, well informed constituency for conservation. Watchable wildlife programs are tools for meeting wildlife conservation goals while at the same time fulfilling public demand for wildlife-dependent recreational activities (other than sport hunting, sport fishing, or trapping).]
watershed	the geographic area within which water drains into a particular river, stream, or body of water. A watershed includes both the land and the body of water into which the land drains.
watershed-wide education networks	systems for sharing educational information, like curriculum development projects, student activities, and ongoing data gathering; a combination of telecommunications and real-life exchanges of information

well-protected

in CCP analysis, a rare species or community type is considered well protected if 75 percent or more of its occurrence sites are on dedicated open space

wetlands

lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. These areas are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted to life in saturated soil conditions. “Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water.”—Cowardin et al 1979

wilderness study areas

lands and waters identified by inventory as meeting the definition of wilderness and being evaluated for a recommendation they be included in the Wilderness System (cf. “recommended wilderness”) [N.B. A wilderness study area must meet these criteria:

1. generally appears to have been affected primarily by the forces of nature, with the imprint of man’s work substantially unnoticeable;
2. has outstanding opportunities for solitude or a primitive and unconfined type of recreation;
3. has at least 5,000 contiguous, roadless acres, or sufficient size to make practicable its preservation and use in an unimpaired condition. (FWS Manual 610 FW 1.5 (draft)).]

wilderness

cf. “designated wilderness”

wildfire

a free-burning fire requiring a suppression response; all fire other than prescribed fire that occurs on wildlands [FWS Manual 621 FW 1.7]

wildland fire

every wildland fire is either a wildfire or a prescribed fire [FWS Manual 621 FW 1.3]

wildlife-dependent recreational use

a use of a national wildlife refuge involving hunting, fishing, wildlife observation and photography, or environmental education and interpretation (National Wildlife Refuge System Administration Act of 1966).

wildlife management

manipulating wildlife populations, either directly by regulating the numbers, ages, and sex ratios harvested, or indirectly by providing favorable habitat conditions and alleviating limiting factors

wildlife-oriented recreation

recreational activities in which wildlife is the focus of the experience [“The terms ‘wildlife-dependent recreation’ and ‘wildlife-dependent recreational use’ mean a use of a refuge involving hunting, fishing, wildlife observation and photography, or environmental education and interpretation.”—National Wildlife Refuge System Improvement Act of 1997]

working landscape

the rural landscape created and used by traditional laborers [N.B. Agriculture, forestry, and fishing all contribute to the working landscape of a watershed (e.g., keeping fields open by mowing or by grazing livestock).]

Acronyms

Acronym	Full Name
ACB	Alliance for the Chesapeake Bay
ACJV	Atlantic Coast Joint Venture
AHWP	Annual Habitat Work Plan
ARPA	Archaeological Resources Protection Act of 1960
BBS	Breeding Bird Survey
BCR	Bird Conservation Region
CCP	Comprehensive Conservation Plan
CEQ	Council on Environmental Quality
CERCCA	Comprehensive Environmental Responsive Compensation and Liability Act
CFR	Code of Federal Regulations
DAPTE	Declining Amphibian Monitoring Program
DCR	Department of Conservation and Recreation
DEQ	Department of Environmental Quality
DO	Dissolved Oxygen
EA	Environmental Assessment
EPA	U.S. Environmental Protection Agency
FMHA	Farmers Home Administration
FONSI	Finding of No Significant Impact
GIS	Geographic information system
GPS	Global positioning system
HMP	Habitat Management Plan
IMP	Inventory and Monitoring Plan
HUC	Hydrologic Units
LWCF	Land and Water Conservation Fund
MANEM	MidAtlantic/New England/Maritimes region
MBCF	Migratory Bird Conservation Fund
MBTA	Migratory Bird Treaty Act
MSDS	Material Safety Data Sheets
NAAMP	North American Amphibian Monitoring Program
NABCI	North American Bird Conservation Initiative
NAWCP	North American Waterbird Conservation Plan

Acronym	Full Name
NAWMP	North American Waterfowl Management Plan
NEPA	National Environmental Policy Act of 1969
NHCR	National State Agency Herptile Conservation Report
NRCS	Natural Resources Conservation Service
NVCS	National Vegetation Clarification System
NWR	National Wildlife Refuge
NWRS	National Wildlife Refuge System
PARC	Partners in Amphibian and Reptile Conservation
PIF	Partners in Flight
PSU	Practical Salinity Units
RONS	Refuge Operations Needs System
SAV	Submerged Aquatic Vegetation
SCEP	Student Career Experience Program
SCORP	State Comprehensive Outdoor Recreation Plan
SHPO	State Historic Preservation Office
SWG	State Wildlife Grant programs
TNC	The Nature Conservancy
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
UV	Ultra violet
VA Tech	Virginia Polytechnic Institute and State University
VA WAP	Virginia Wildlife Action Plan
VCU	Virginia Commonwealth University
VDGIF	Virginia Department of Game and Inland Fisheries
VDNH	Virginia Division of Natural Heritage
VDOT	Virginia Department of Transportation
VHS	Virginia Herpetological Society
VIMS	Virginia Institute of Marine Science
VNHP	Virginia Natural Heritage Program
VSO	Virginia Society of Ornithology

Bibliography

USFWS



Volunteer helping to construct trail

Bibliography

- Abel, K. W., S. M. Hagan, and S. A. Brown. 2003. Mechanisms of Marsh Habitat Alteration Due to *Phragmites*: Response of Young-or-the-year Mummichog (*Fundulus heteroclitus*) to Treatment for *Phragmites* Removal. *Estuaries* 26, No. 2B: 484–494.
- Abrams, M. D. and B. A. Black. 2000. Dendroecological analysis of a mature loblolly pine–mixed hardwood forest at the George Washington Birthplace National Monument, eastern Virginia.
- Ake, R. White Stone, VA BBS Route surveyor, personal communication 10/2/2006.
- Alliance for the Chesapeake Bay, 2003. The Rappahannock and the Chesapeake Bay. www.acb-online.org/pubs/projects/deliverables-151-4-2003.pdf
- Allombert, S., A. J. Gaston, and J. L. Martin. 2005. A natural experiment on the impact of overabundant deer on songbird populations. *Biological Conservation*. 126(1):1-13.
- Askins, R. A. 2000. Restoring North America's birds. Yale University Press, New Haven, CT. 332 pp.
- Askins, R. A. 2002. Restoring North America's Birds: Lessons from Landscape Ecology, 2nd Ed. Yale University Press, New Haven and London. 332 pp.
- Atlantic Coast Joint Venture. 2005. Atlantic Coast Joint Venture Waterfowl Implementation Plan Revision.
- Atlantic Coast Joint Venture. 2007. New England/Mid-Atlantic Coast Bird Conservation Region (BCR) 30 Implementation Plan
- Atlantic Sturgeon Status Review Team. 2007. Status Review of Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*). Report to National Marine Fisheries Service, Northeast Regional Office. February 23, 2007. 174 pp.
- Augustine, D. J. and L. E. Frelich. 1998. Effects of white-tailed deer on populations of understory forb in fragmented deciduous forests. *Conservation Biology*. 12(5): 995–1004.
- Bakker, K. K., D. E. Naugle, and K. F. Higgins. 2002. Incorporating landscape attributes into models for migratory grassland bird conservation. *Conservation Biology*. 6:1638–1646.
- Baldwin, R. F., A. J. K. Calhoun, and P. G. DeMaynadier. 2006. Conservation planning for amphibian species with complex habitat requirements: a case study using movements and habitat selection of the wood frog, *Rana sylvatica*. *Journal of Herpetology*, Vol. 40, No. 4, pp. 442–453.
- Banks, P. B. and J. V. Bryant. 2007. Four-legged friend or foe? Dog-walking displaces native birds from natural areas. *Animal Behavior Biological Letters* (3) 611–613
- Belden, A. Jr., A. C. Chazal, and P. P. Coulling. 2002. A natural heritage inventory of the Rappahannock River Valley NWR potential acquisition area. Natural Heritage Technical Report 02–08. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, VA 134 pp.

- Birds of the Rappahannock River Valley National Wildlife Refuge. 2006 (unpublished).
- Blossey, B. 1999. Before, during and after: the need for long-term monitoring in invasive species management. *Biological Invasions* 1:301–311.
- Blossey, B. and J. D. Maerz. No date. A Proposal for Developing Standardized Protocols to Assess Potential Impacts of Invasive Plants on Amphibian Habitat Quality. Ecology and Management of Invasive Plants Program, Department of Natural Resources, Cornell University, Ithaca, NY. (unpubl).
- Bowles, M. L. 1999. Eastern Prairie Fringed Orchid: *Platanthera leucophaea* (Nuttall) Lindley: Recovery Plan. *Prepared by* the Morton Arboretum for United States Fish and Wildlife Service, Region 3. <http://www.fws.gov/midwest/endangered/recovery/r3rplans.html>.
- Brown, S., C. Hickey, B. Harrington, and R. Gill, eds. 2001. The Shorebird Conservation Plan, 2nd ed. Manomet Center for Conservation Sciences, Manomet, MA.
- Buchanan, B. W. 2002. Observed and potential effects of artificial light on the behavior, ecology, and evolution of nocturnal frogs. In Proceedings of the Urban Wildlands Group, Ecological consequences of artificial night lighting, February 23-24, 2002. Los Angeles, CA. Catherine Rich & Travis Longcore, Conference Co-Chairs.
- Burton, T. M. and G. E. Likens. 1975. Salamander populations and biomass in the Hubbard Brook Experiment. *Copeia* 1975:541–546.
- Caroline County. 2006. Webpage for Caroline County, Virginia. www.co.caroline.va.us.
- Center for Conservation Biology (CCB). 2002. Habitat Assessment, Pine Plantation. http://ccb.wm.edu/habitat/hab/hab_pine_back.htm (Accessed August 14, 2007).
- Chesapeake Bay Foundation. 2006. CBF Applauds Virginia Proposal to Cap Menhaden Catch. Monday, July 31, 2006. Article by CBF staff at: <http://cbf.org/site/News2?page=NwsArticle&id=19243> (Accessed August 17, 2007).
- Chesapeake Bay Program. 2006. Atlantic Menhaden. www.chesapeakebay.net/atlantic_menhaden.htm (Accessed April 2006).
- Clark, K. E. and L. J. Niles, North Atlantic Shorebird Habitat Working Group. 2000. North Atlantic Regional Shorebird Plan. Endangered and Nongame Species Program, NJ Division of Fish and Wildlife, Woodbine, NJ, and Members of the North Atlantic Shorebird Habitat Working Group.
- Cline, K. W. 1985. Bald eagles in the Chesapeake: A management guide for landowners. National Wildlife Federation, Washington, D.C.
- Cline, K. W. 1993. Bald Eagle nest management in Virginia. Virginia Department of Game and Inland Fisheries, Nongame and Endangered Species Program. Planning Document.
- Comer, P., D. Faber–Langendoen, R. Evans, S. Gawler, C. Josse, G. Kittel, S. Menard, M. Pyne, M. Reid, K. Schulz, K. Snow, and J. Teague. 2003. Ecological Systems of the United States: A Working Classification of U.S. Terrestrial Systems. NatureServe, Arlington, Virginia.

- Commonwealth of Virginia. 1988. Rappahannock Water Supply Plan. Virginia State Water Control Board. Richmond, VA 294 pp.
- Cooper, J., B. Portlock, S. Spencer. 2005. Rappahannock River Winter Bald Eagle Survey, February 7, 2005. Joint VDGIF, CBF, and USFWS unpublished data.
- Dauer, D. M., H. G. Marshall, J. R. Donat, M. F. Lane, P. L. Morton, S. C. Doughten, F. A. Hoffman. 2005. Status and Trends in Water Quality and Living Resources in the Virginia Chesapeake Bay: Rappahannock River (1985–2004). Chesapeake Bay Program, Virginia Department of Environmental Quality (DEQ). March 2005.
- David L.; Conner, Richard N., eds. Wilderness and natural areas in the eastern United States: a management challenge. Nacogdoches, TX: Center for Applied Studies, School of Forestry, Stephen F. Austin State University: 253–258.
- Davis, S. K. 2004. Area sensitivity in grassland passerines: effects of patch size, patch shape, and vegetation structure on bird abundance and occurrence in Southern Saskatchewan. *The Auk* 121(4):1130–1145.
- Droege, S. and Shapiro. L. 2009. USGS Refuge Native Bee Survey. <http://beerefuge.blogspot.com>
- Easton, W. E. and K. Martin. 2002. Effects of Thinning and Herbicide Treatments on Nest-Site Selection by Songbirds in Young Managed Forests. *The Auk* 119(3):685–694.
- Ecological Society of America. 2004. Guidelines for Describing Associations and Alliances of the U.S. National Vegetation Classification. Version 4.0
- Egloff, Keith and Deborah Woodward. 2006. *First People: The Early Indians of Virginia*, second edition. University of Virginia Press, Charlottesville and London.
- Elliott, Katherine J. and James M. Voss. 2005. Initial Effects of Prescribed Fire on Quality of Soil Solution and Streamwater in the Southern Appalachian Mountains. *Southern Journal of Applied Forestry* 29(1):5–15.
- Essex County, 2006. www.essex-virginia.org.
- Fall, Ralph Emmett. 1982. *Hidden Village- Port Royal, Virginia 1744–1981*. McClure Printing Company, Inc., Verona, Virginia.
- Fischer, R. A., and Fischenich, J. C. 2000. Design recommendations for riparian corridors and vegetated buffer strips,” EMRRP Technical Notes Collection (ERDC TN–EMRRP–SR–24), U.S. Army Engineer Research and Development Center, Vicksburg, MS.
- Fleming, G. P., P. P. Coulling, D. P. Walton, K. M. McCoy, and M. R. Parrish. 2001. The natural communities of Virginia: classification of ecological community groups. First approximation. Natural Heritage Report 01–1. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, VA. Unpublished report. January 2001. 76 pp.
- Fleming, G. P., P. P. Coulling, K. D. Patterson, K. M. McCoy. 2004. The natural communities of Virginia: classification of ecological community groups. Second approximation. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, VA. <http://www.dcr.virginia.gov/dnh/ncintro.htm>.

- Fleming, G. P., P. P. Coulling, K. D. Patterson, and K. Taverna. 2006. The natural communities of Virginia: classification of ecological community groups. Second approximation. Version 2.2. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, VA. http://www.dcr.virginia.gov/natural_heritage/ncintro.html (Accessed 1/23/2006).
- Forsell, D., U.S. Fish and Wildlife Service, Migratory Bird Biologist, Chesapeake Bay Field Office, personal communication, July 11, 2005.
- France, M. 2007. Pers. communications.
- Frank, K. 1988. Impact of outdoor lighting on moths. *Journal of the Lepidopterists' Society*, volume 42, pp. 63-93.
- Frank, K. 2002. Impact of artificial lighting on moths. In *Proceedings of the Urban Wildlands Group, Ecological consequences of artificial night lighting*, February 23-24, 2002. Los Angeles, CA. Catherine Rich & Travis Longcore, Conference, Co-Chairs.
- Grumet, Robert S. 2000. Bay, Plain, and Piedmont: A Landscape History of the Chesapeake Heartland from 1.3 Billion Years Ago to 2000. The Chesapeake Bay Heritage Context Project, 183 pp. Annapolis, MD: U.S. Department of Interior, National Park Service.
- Guerry A. D., M. L. Hunter, Jr. 2002. Amphibian distributions in a landscape of forests and agriculture: an examination of landscape composition and configuration. *Conservation Biology* 16:745-754
- Hamel, P. B. 1992. The land managers guide to the birds of the South. The Nature Conservancy, Southeastern Region, Chapel Hill, N.C. 437 p.
- Hammet, J. E. 1992. The shapes of adaptation: historical ecology of the anthropogenic landscapes in the Southeastern United States. *Landscape Ecology*. (7)2; 121-135.
- Hammitt, William E. 1986. Resource impacts of recreation on wilderness. In: Kulhavy, David L.; Conner, Richard N., eds. *Wilderness and natural areas in the eastern United States: a management challenge*. Nacogdoches, TX: Center for Applied Studies, School of Forestry, Stephen F. Austin State University: 253-258
- Haramis, G. M., E. L. Derleth, and D. G. McAuley. 1982 Techniques for trapping, aging, and banding wintering canvasbacks. *J. Field Ornithol.* 53:177-183
- Heath, S. 2006. Virginia Avian Records Committee (VARCOM), Virginia Society of Ornithology. Personal communication, August 2006.
- Helzer, C. J. and D. E. Jelinski. 1999. The relative importance of patch area and perimeter-area ratio to grassland breeding birds. *Ecological Applications* 9:1448-1458
- Heyer, W., M. Donnelly, R. McDiarmid, L. Hayek, and M. Foster. 1994. *Measuring and Monitoring Biological Diversity, Standard Methods for Amphibians*. Smithsonian Institution Press. 320 pp.
- Historic Port Royal, Inc. 2006. Webpage for Port Royal, Virginia. www.historicportroyal.com.

- Houlahan, J. E. and C. S. Findlay. 2004. Estimating the 'critical' distance at which adjacent land-use degrades wetland water and sediment quality. *Landscape Ecology* 19:677–690.
- Hutto, R. L. 1998. Using landbirds as an indicator species group. In *Avian Conservation: Research and Management*. (J. M. Marzluff and R. Sallabanks, eds.). Island Press, Wash. D.C. pp. 79–92.
- Johnston, S. A. 2003. orientation and migration distances of a pond-breeding salamander (*Notophthalmus perstriatus*, *salamandridae*). *Alytes*, 2003, 21 (1–2): 3–22.
- Jones, A. L. and P D. Vickery. 1999. Managing Small Grasslands including Conservation Lands, Corporate Headquarters, Recreation Fields, and Small Landfills for Grassland Birds. Grassland Conservation Program, Center for Biological Conservation, Massachusetts Audubon Society.
- Kale II, H. W. 1965. Ecology and bioenergetics of the long-billed marsh wren (*Telmatodytes palustris griseus*) in Georgia salt marshes. *Nuttall Ornithological Club*, No. 5. Cambridge, MA.
- Kearney, M. S., A. S. Rogers, J. R. G. Townshend, J. C. Stevenson, E. Rizzo, D. Stutzer, and K. Sundberg. 2002. Landsat imagery shows decline of coastal marshes in Chesapeake and Delaware Bays. In *EOS. Amer. Geophys. Union* 83: 173,177–178.
- King George County. 2006. Webpage for King George County, Virginia. www.king-george.va.us.
- Kirwan, J. L. and H. H. Shugart. 2000. Vegetation and two indices of fire on the Delmarva Peninsula. *Journal of the Torrey Botanical Society* 127(1), pp.44–50.
- Klapproth, Julia C. and James E. Johnson. 2000. Understanding the Science Behind Riparian Forest Buffers: Effects on Water Quality. Virginia Cooperative Extension, College of Natural Resources, Virginia Tech, Blacksburg, VA. Publication Number 420–151. 16pp.
- Lamie, R. David. 1997. The Economic Impact of Agriculture and Ag-Related Industries on the Commonwealth of Virginia. Department of Agricultural and Applied Economics, Virginia Tech University.
- Lamoureux, V. S, J. C. Maerz, and D. M. Madison. 2002. Pre-migratory autumn foraging forays in the green frog, *Rana clamitans*. *Journal of Herpetology* 36:245–254.
- Lancaster County Chamber of Commerce. 2006. www.lancasterva.com.
- Langdon, M. and T. Cronin. 2003. A Summary Report of Sediment Process in the Chesapeake Bay and Watershed. US Dept of Interior and US Geological Survey. Water Resources Investigation Report 03–4123.
- Laskowski R. A., M. W. MacArthur, D. S. Moss and J. M. Thornton (1993) PROCHECK: a program to check the stereochemical quality of protein structures. *Journal of Applied Crystallography*, 26: 283–291.
- Liddle, Michael. 1997. Recreation ecology: the ecological impact of outdoor recreation and ecotourism. London, United Kingdom: Chapman and Hall. 639 p.

- Lindzey, D. L. 1998. The Mammals of Virginia. McDonald & Woodward Publishing Company, Blacksburg, VA .
- Lingenfelter, Susan. U.S. Fish and Wildlife Service Ecological Services, Virginia Field Office, personal communication, September 2005.
- Louv, Richard. 2005. Last Child in the Woods: Saving our Children from Nature-Deficit Disorder. Algonquin Books of Chapel Hill.
- Lyon, L. J., R. G. Hooper, E. S. Telfer, D. S. Schreiner. 2000. Fire effects on wildlife foods. In USDA Forest Service General Technical Report RMRS-GTR-42-vol.1. 2000. Wildland Fire in Ecosystems
- MANEM Waterbird Working Group. 2006. Waterbird Conservation Plan for the Mid-Atlantic/New England/Maritimes Region: 2006–2010. Waterbird Conservation for the Americas (www.waterbirdconservation.org).
- Marquez, M. Ricah, Brad Botwick and David Price. 2008. Phase I Archaeological Survey of the Rappahannock River Valley National Wildlife Refuge, Richmond and Essex Counties, Virginia. New South Technical Report #1492. Submitted to Federal Highway Administration. Stone Mountain, GA.
- Marsh, D. M., G. S. Milam, Gorham, N. P. N. G. Beckman. 2005. Forest roads as partial barriers to terrestrial salamander movement. *Conservation Biology*. 19:6, 2004–2008.
- Maryland Department of Natural Resources (MD DNR). 2000. Shore Erosion Taskforce Final Report. Shore Erosion Control/Coastal Zone Management Division. Annapolis, MD. www.dnr.state.md.us. Accessed August 10, 2006.
- McCullough, D. R., 1982. The theory and management of *Odocoileus* populations. In *Biology and Management of the Cervidae*. Wemmer, C. (ed.) 1987; 535–549. Res. Symposium National Zoological Park.
- McIninch, S.P . and G. C. Garman. 1999. The anadromous clupeid fishes of the Chesapeake Bay. An evaluation of essential habitat and barriers to migration in the Rappahannock River basin. Final Project Report to VA Department of Game and Inland Fisheries, Richmond, VA.
- McNab, W. H. and P. E. Avers, 1994. Ecological Subregions of the United States. Technical Report WO–WSA–5, U.S. Forest Service, Washington D.C.
- Menokin Foundation (ca. 2006). Visitors' Guide - Francis Lightfoot Lee's Menokin c. 1769. Menokin Foundation, Warsaw, Virginia.
- Middle Peninsula Planning District Commission. 2006. www.mppdc.com.
- Middlesex County. 2006. Webpage for Middlesex, Virginia. www.co.middlesex.va.us.
- Miller, S. G., R. L. Knight, and C. K. Miller. 2001. Wildlife responses to pedestrians and dogs. *Wildlife Society Bulletin* 29 (1): 124–132.
- Miller, M. 2000. Chapter 2: Fire autecology. In *Wildland fire in ecosystems, effects of fire on flora*. USDA Forest Service Gen. Tech. Rep. RMRS-GTR-42.vol.2.

- Mitchell, J. C., A. R. Breisch, and K. A. Buhlmann. 2006. Habitat Management Guidelines for Amphibians and Reptiles of the Northeastern U.S. Partners in Amphibian and Reptile Conservation, Technical Publication HMG-3, Montgomery, Alabama, 108 pp
- Mitsch, W. J. and J. G. Gosselink. 1993. Wetlands. Van Nostrand Reinhold, New York, NY. 721 pp.
- Monarch Larvae Monitoring Project, 2003–2004. King George County, Palmer residence entrance driveway garden, <http://www.mlmp.org/results>.
- Montague, P. 1998. Frogs, alligators and pesticides. Rachel's Environment and Health Weekly, Environmental Research Foundation, March 21, 1998. <http://www.crcwater.org/issues4/frogwater2.html> (Accessed July 2007).
- Morris, George. 1680. Lands in Dispute Between Henry Reeves and Mr. William Daingerfield. Mss. 7:2T1655:1. Copy on file with Essex County Land Trials 1715–1741: p. 136+.
- Mossman, M. Rasmussen, P., Sauer, J., Droegge, S. No Date. Wisconsin Frog Survey Analysis: Sample size estimation for amphibian calling surveys and some surprising trends from 11-year analysis of Wisconsin frog and toad survey data. Abstract for NAAMP II Meeting in Toronto, 1996.
- National Wildlife Refuge Association. 2002. The Silent Invasion: A Call to Action. 17pp.
- National Research Council. 2006. Status of Pollinators in North America. National Academies Press, Washington, DC. <http://www.ipm.msu.edu/plants/publications.htm>.
- NatureServe1. 2004. International Ecological Classification Standard: Terrestrial Ecological Classifications. Chesapeake Bay Lowlands (Ecoregion 58). NatureServe Central Databases. Arlington, VA. Data current as of 11 November 2004.
- Neitsch SL, Arnold JG, Kinney JP, and Williams JR. 2001. Soil and water assessment tool documentation. (20 February 2003; www.brc.tamus.edu/swat/swat2000doc.html).
- Newsome, David; Moore, Susan A.; Dowling, Ross K. 2002. Environmental impacts. In: Newsome, David; Moore, Susan A.; Dowling, Ross K. Natural area tourism: ecology, impacts and management. Clevedon, United Kingdom: Channel View Publications: 79–145.
- Northern Neck Tourism Council. 2006. www.northernneck.org/
- Odenkirk, J. VDGIF Fish Passage Biologist. Personal communication. July 27, 2006.
- Office of the Federal Register National Archives and Records Administration. (CFR) 2007. Code of Federal Regulations.
- Orth, R. J., J. R. Nowak, G. F. Anderson, D. J., Wilcox, J. R. Whiting, and L. S. Nagey. 1996. 1995 Distribution of Submerged Aquatic Vegetation in the Chesapeake Bay. College of William and Mary School of Marine Science, Virginia Institute of Marine Science.

- Orwig, D. A. and M. D. Abrams. 1994. Land-use history (1720–1992), composition, and dynamics of oak–pine forests within the Piedmont and Coastal Plain of northern Virginia. *Canadian Journal of Forestry Research*, Vol. 24
- Pease, M. L., R. K. Rose, and M. J. Butler. 2005. Effects of human disturbances on the behavior of wintering ducks. *The Wildlife Society Bulletin*. 33(1): 103–112.
- Peterjohn, W. T. and D. L. Correll. 1984. Nutrient dynamics in an agricultural watershed: observations on the role of a riparian forest. *Ecology* 65:1466–1475.
- Pieman, J., M. L. Leonard, and A. Horn. 1988. Antipredation role of clumped nesting by marsh–nesting red–winged blackbirds. *Behavioral Ecology and Sociobiology* 22:9–15.
- Pope S. E., L. Fahrig, and H. G. Merriam (2000) Landscape complementation and metapopulation effects on leopard frog populations. *Ecology* 81:2498–2508
- Portlock, W. Sharps, VA BBS Route surveyor, personal communication, 9/21/2006.
- Ramankutty, N. and J. A. Foley. 1999. Estimating Historical Changes in Land Cover: North American Croplands from 1850 to 1992. *Global Ecology and Biogeography*, Vol.8, No.5. pp. 381–396.
- Relyea, R. A., N. M. Schoeppner, and J. T. Hoverman. 2005. Pesticides and amphibians: the importance of community context. *Ecological Applications*, 15(4)1125–1134.
- Relyea, R. A. 2005a. The lethal impacts of roundup and predatory stress on six species of North American tadpoles. *Archives of Environmental Contamination and Toxicology*. 48, 351–357.
- Relyea, R. A. 2005b. The lethal impact of roundup on aquatic and terrestrial amphibians. *Ecological Applications*, 15(4) 1118–1124.
- Rich, T. D., C. J. Beardmore, H. Berlanga, P. J. Blancher, M. S. W. Bradstreet, G. S. Butcher, D. W. Demarest, E. H. Dunn, W. C. Hunter, E. E. Inigo–Elias, J. A. Kennedy, A. M. Martell, A. O. Panjabi, D. N. Pashley, K. V. Rosenberg, C. M. Rustay, J. S. Wendt, T. C. Will. 2004. *Partners in Flight North American Landbird*
- Conservation Plan. Cornell Lab of Ornithology. Ithaca. NY.
- Richmond County. 2006. Webpage for Richmond County, Virginia.
www.co.richmond.va.us
- Robinette, C. E. and A. S. Hoppe. 1982. Soil Survey of Richmond County, VA US Dept of Agriculture. Soil Conservation Service. 126 pp.
- Rodenhouse, N. L., L. B. Best, R. J. O'Connor, and E. K. Bollinger. 1993. Effects of temperate agriculture on neotropical migrant landbirds. In *Status and management of neotropical migratory birds*. D. M. Finch and P. W. Stangel, eds. GenTechRep RM–229, USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Ft. Collins. pp 280–295.
- Rosenberg, K. V., B. D. Watts, R. Dettmers. 2004. Atlantic Cost Joint Venture and Partners in Flight: Southern New England/Mid-Atlantic Coastal Plain Bird Conservation Assessment (for Bird Conservation Area 30) November.

- Rosenberg, K. V., R. W. Rohrbaugh, Jr., S. E. Barker, J. D. Lowe, R. S. Hames, and A. A. Dondt. 1999. A land manager's guide to improving habitat for scarlet tanagers and other forest interior birds. The Cornell Lab of Ornithology.
- Rosenberg, K. V., R. S. Hames, R. W. Rohraugh, Jr., S. Barker Swarthout, J. D. Lowe, and A. A. Dondt. 2003. A land manager's guide to improving habitat for forest thrushes. The Cornell Lab of Ornithology.
- Rottenborn, S. C. and E. S. Brinkley. 2007. Virginia's Birdlife—An Annotated Checklist, Fourth Edition, Virginia Society of Ornithology, Virginia Avifauna, No. 7.
- Saltonstall, K., P. M. Peterson, and R. J. Soreng. 2004. Recognition of *Phragmites australis* subsp. *Americanus* (Poaceae: Arundinoideae) in North America: evidence from morphological and genetic analyses. *SIDA* 21(2): 683–692.
- Sauer, J. R. B. G. Peterjohn, S. Schwartz, and J. E. Hines. 1995. The Grassland Bird Homepage. Version 95.0. Patuxent Wildlife Research Center. Laurel, MD. <http://www.mbr-pwrc.usgs.gov/bbs/grass/grass.htm>.
- Schmidt, Kenneth A. and Christopher J. Whelan. 1999. Effects of Exotic *Lonicera* and *Rhamnus* on Songbird Nest Predation. *Conservation Biology*, Volume 13, Number 6, pp. 1502–1506.
- Schroeder, R. L. and Askerooth, K. 1999. A habitat-based approach to management of tallgrass prairies at the Tewaukon National Wildlife Refuge. Information and Technology Report USGS/BRD/ITR—2000–0001.
- Schwab, D. 2004. Unpublished VDGIF Report.
- Secor, David H. et. al. Dispersal and growth of yearling Atlantic sturgeon, *Acipenser oxyrinchus*, released into Chesapeake Bay. *Fishery Bulletin* 98(4) 2000 pp 800–810.
- Semlitsch, R. D. (1998). "Biological delineation of terrestrial buffer zones for pond breeding salamanders," *Conservation Biology* 12, 113–119, in Fischer, R. A., and Fischenich, J. C. (2000). "Design recommendations for riparian corridors and vegetated buffer strips," EMRRP Technical Notes Collection (ERDC TN–EMRRP–SR–24), U.S. Army Engineer Research and Development Center, Vicksburg, MS. www.wes.army.mil/el/emrrp.
- Semlitsch, R. D. 1998. Biological delineation of terrestrial buffer zones for pond-breeding salamanders. *Conservation Biology*, Vol. 12, No. 5. (Oct. 1998), pp. 1113–1119.
- Shepherd, M., S. L. Buchmann, M. Vaughan, S. H. Black. 2003. Pollinator Conservation Handbook. The Xerces Society. Portland, Oregon. 145 pp.
- Smart, M., G. O. Dick, and R. D. Doyle. 1998. Techniques for Establishing Native Aquatic Plants. *Journal of Aquatic Plant Management*. 36:44–49.
- Solensky, M. J. 2004. The monarch butterfly: biology and conservation. Cornell University Press. Ithaca and London. 248 pp.
- Spells, A. 1993. Report on fisheries value in the Rappahannock River, Va. LAPS project. USFWS R5 Realty document, June 18, 1993.

- Spencer, S. C. 1999. Breeding requirements and habitat selection in a remnant population of marsh wren (*Cistothorus palustris*) at Dyke Marsh National Wildlife Preserve. Proceedings of the XXth Symposium for Conservation Biology, Beltsville, MD June X, 1999.
- Spencer, Sandy. U.S. Fish and Wildlife Service. Wildlife Biologist. Eastern Virginia Rivers National Wildlife Refuge Complex.
- Stafford, K. C. 2004. An integrated guide for homeowners, pest control operators, and public health officials for the prevention of tick-associated disease. Connecticut Agricultural Experiment Station, New Haven, CT.
- Steinkamp M. 2007. Bird Conservation Region 30 plan. Conservation priority categories for bird species in BCR 30. Atlantic Coast Joint Venture (www.acjv.org).
- Stevenson, J. C., J. Rooth, M. S. Kearney and K. Sundberg. 2000. The health and long term stability of natural and restored marshes in Chesapeake Bay. Pages 709–735, in Concepts and Controversies in Marsh Ecology, M. Weinstein and D. Kreeger, eds. Dordrecht, Netherlands: Kluwer Press.
- Stevenson, J. C., M. S. Kearney and E. C. Pendleton. 1985. Sedimentation and erosion in a Chesapeake Bay brackish marsh system. *Marine Geology* 67: 212–235.
- Stevenson, J. C., M. S. Kearney and E. W. Koch. 2002. Impacts of sea-level rise on tidal wetlands and shallow water habitats: a case study from Chesapeake Bay. In Fisheries in a Changing Environment, N. McGinn, ed. Bethesda, Md.: American Fisheries Society.
- Tallamy, D. 2007. Bringing Nature Home: How native plants sustain wildlife in our gardens. Timber Press. Portland, London. 288 pp.
- The Nature Conservancy. 2001. The Chesapeake Rivers Site Conservation Plan.
- The Nature Conservancy. 2001. Tools and Techniques for Use in Natural Areas. Weed Control Methods Handbook, pp 7j.1 – 7j.5.
- Tiner, R. W., J. Q. Swords, and H. C. Bergquist. 2005. Recent Wetland Trends in Southeastern Virginia: 1994–2000. U.S. Fish and Wildlife Service, Northeast Region, Hadley, MA. NWI Wetland Trends Report. 17pp.
- Titus, J. G., R. A. Park, S. P. Leatherman, J. R. Weggel, M. S. Greene, P. W. Mausel, S. Brown, G. Gaunt, M. Trehan, G. Yohe. 1991. Greenhouse Effect and Sea Level Rise: The Cost of Holding Back the Sea. *Coastal Management*, Vol. 19. 171–204.
- U.S. Army Corps of Engineers. 2002. Environmental Assessment for Removal of Embrey Dam. <http://www.nao.usace.army.mil/projects/completed/embrey/Docs.htm>.
- U.S. Census Bureau. 2006. Census 2000 Summary File, American FactFinder. <http://factfinder.census.gov>.
- U.S. Climate Change Science Program. 2009: Coastal Sensitivity to Sea-Level Rise: A Focus on the Mid-Atlantic Region. A report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research. [James G. Titus (Coordinating Lead Author), K. Eric Anderson, Donald R. Cahoon, Dean B. Gesch, Stephen K. Gill, Benjamin T. Gutierrez, E. Robert Thieler, and S. Jeffress Williams (Lead Authors)], U.S. Environmental Protection Agency, Washington D.C., USA.

- USDA Forest Service. 1989. Environmental Effects of Prescribed Burning. Technical Publication R8-TP-11. 5pp.
- USDA Forest Service. 2007. Effects of Soil Properties: Review of Proposed Herbicides. Final Environmental Impact Statement, Mt. Hood National Forest, Integrated Weed Management Program, Appendix U. 8pp.
- USDA Forest Service. 2007. Gypsy moth in North America. www.fs.fed.us/ne/morgantown/4557/gmoth/natenem/virus.html (Accessed June 26, 2007).
- U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System. 2002, <http://www.bea.gov/bea/regional/reis/>
- U.S. Department of the Interior. National Park Service. May 2003. Assessment of Air Quality and Related Values in Shenandoah National Park. Technical Report NPS/NERCHAL/NRTR-03/090. Sullivan et al contributors. 1 page.
- U.S. Environmental Protection Agency Office of Policy. 1998. Climate Change and Virginia. (2111) EPA 236-F-98-007bb. September. xxx pp.
- U.S. Fish and Wildlife Service. 1987. Habitat management guidelines for the bald eagle in the southeast region. Third revision. Atlanta, GA.
- U.S. Fish and Wildlife Service, Region 4. 1995. Endangered and Threatened Species of the Southeastern United States (The Red Book). 1/95.
- U.S. Fish and Wildlife Service. 1995. Final Environmental Assessment: Proposal to Establish The Rappahannock River Valley National Wildlife Refuge, Virginia. Hadley, Massachusetts. 90 pp.
- U.S. Fish and Wildlife Service. 1995. Sensitive Joint-Vetch (*Aeschynomene virginica*) Recovery Plan. Hadley Massachusetts. 55 pp.
- U.S. Fish and Wildlife Service. 2002. Birds of conservation concern 2002. Division of Migratory Bird Management, Arlington, Virginia. 99 pp. [Online version available at <http://migratorybirds.fws.gov/reports/bcc2002.pdf>]
- U.S. Fish and Wildlife Service. 2003. The National Strategy for Management of Invasive Species – National Wildlife Refuge System. 69pp.
- U.S. Fish and Wildlife Service. 2003. Final Environmental Assessment, Public Fishing on the Rappahannock River Valley National Wildlife Refuge
- U.S. Fish and Wildlife Service. 2006. Global Warming: Background Information and Talking Points, May 1, 2006. 3 pp.
- U.S. Geological Survey (USGS). 2003. A Summary Report of Sediment Processes in Chesapeake Bay and Watershed. Water-Resources Investigations Report 03-4123. xxx pp.
- U.S. Geological Survey. 2007. Breeding Bird Survey, Patuxent Wildlife Research Center. Website: www.mbr-pwrc.usgs.gov/cgi-bin/atlas99. Accessed August 3, 2006.
- U.S. Geological Survey. Fort Collins Science Center, Policy Analysis and Science Assistance Branch. 2007. Regional Economic Analysis of Current and Proposed Management Alternatives for the Rappahannock River Valley National Wildlife Refuge. Report #. Xx pp.

- United States Geological Survey. 2008. Freshwater-Saltwater Interactions along the Atlantic Coast: Saltwater Intrusion. Accessed at <http://water.usgs.gov/ogw/gwrp/saltwater/salt.html#fig2>.
- U.S. North American Bird Conservation Initiative Committee (NABCI). 2000a. North American Bird Conservation Initiative: Bringing it all together. U.S. Fish and Wildlife Service, Arlington, Virginia. <http://www.nabci-us.org/aboutnabci/fwsbroch.pdf>.
- Vickery, P. D. 1996. Grasshopper sparrow (*Ammodramus savannarum*) In The birds of North America, No. 239 Poole and F. Gill, ed. The Academy of Natural Sciences. Philadelphia, PA and the American Ornithological Union, Washington, D.C.
- Vickery, P. D. 1996. Grasshopper sparrow (*Ammodramus savannarum*) In The birds of North America, No. 239, Poole and F. Gill, ed. The Academy of Natural Sciences. Philadelphia, PA. and the American Ornithological Union, Washington, D.C.
- Vickery, P. D., J. R. Herkert, F. L. Knopf, J. Ruth, and C. E. Keller. 1999. Grassland birds: An overview of threats and recommended management strategies, in R. Bonney, D. N. Pashley, R. Cooper, and L. Niles, editors. Strategies for bird conservation: The Partners in Flight Planning Process. Cornell Lab of Ornithology. <http://birds.cornell.edu/pifcapemay>.
- Vinson, M. 1998. Effects of recreational activities on declining anuran species in the John Muir Wilderness, CA. Missoula, MT: University of Montana (Thesis). 83 p.
- Virginia Comprehensive Wildlife Conservation Strategy. 2005. www.vawildlifestrategies.org (accessed April 2006).
- Virginia Department of Agriculture and Consumer Services, 2003. Crop Status Report, Volume 11, Issue 1, May 2003.
- Virginia Department of Agriculture and Consumer Services, 2006. 2003–2004 Virginia Agriculture Facts and Figures. <http://vdacs.virginia.gov/agfacts>.
- Virginia Department of Conservation and Recreation (VDCR). 2004. Better Land Use Planning for Coastal Virginia. VDCR, Division of Chesapeake Bay Local Assistance.
- Virginia Department of Conservation and Recreation. 2007. Draft Virginia Outdoors Plan. http://www.dcr.virginia.gov/recreational_planning/vop.html
- Virginia Department of Education, Prince William Network, and Virginia Council on Indians. 2005. Virginia Indians Today: Rappahannock. Electronic document, http://virginiaindians.pwnet.org/today/chiefs_rappahannock.php (accessed July 1, 2008).
- Virginia Department of Environmental Quality (DEQ). 2004. Final Water Quality Assessment Integrated Report 305(b)/303(d). www.deq.virginia.gov/wqa (accessed April 2006).
- Virginia Department of Environmental Quality 2005. "Status and Trends in Water Quality and Living Resources in the Virginia Chesapeake Bay: Rappahannock River (1985–2004)" by D. M. Dauer, H. G. Marshall, J. R. Donat, M. F. Lane, P. L. Morton, S. C. Doughten, F. A. Hoffman. Chesapeake Bay Program, Virginia Department of Environmental Quality. March 2005.

- Virginia Department of Forestry, 2006. www.dof.virginia.gov/resinfo/forest-facts.shtml
- Virginia Department of Game and Inland Fisheries. 2008. Northern Bobwhite Quail Action Plan for Virginia. Draft Plan, July 2008. <http://www.dgif.virginia.gov/wildlife/quail/action-plan/draft-quail-action-plan.pdf>
- Virginia Department of Game and Inland Fisheries. 2005. Virginia's Comprehensive Wildlife Conservation Strategy. Virginia Department of Game and Inland Fisheries, Richmond, Virginia.
- Virginia Farm Bureau Federation, 2006. Richmond, Essex, Westmoreland, King George, Caroline County pages. www.vafb.com
- Virginia Institute of Marine Science. 1970. Completion Report Embodying Annual Progress Report, Anadromous Fish Project. Project No: Virginia AFC-1; 3 March 1967-30 September 1970.
- Virginia Institute of Marine Science. 2005. Annual Submerged Aquatic Vegetation Survey. www.vims.edu/bio/sav/2005obs.html (accessed April 2006).
- Virginia's Middle Peninsula. 2006. www.middlepeninsula.com
- Virginia Tourism Corporation, 2005. Press Release: Governor Warner Announces Tourism Increase Results In 35.9 Million Visits And \$15.3 Billion For Virginia's Economy. <http://www.vatc.org/pr/prnews/04economicimpact.htm>
- Ware, J. 2007. Virginia Commonwealth University. Unpublished data and personal communications. August 2007. Discussion on snake lesion study.
- Warner, C. W. H. 1971. The Establishment of Tappahannock in Essex County Historical Bulletin No. 1, November 1971. Tappahannock, Virginia. Warsaw and Richmond County Chamber of Commerce, 2006. www.warsawrcchamber.com
- Watts, B. D., D. S. Bradshaw and J. G. Bradshaw. 1992. The influence of marsh size on marsh value for bird communities of the lower Chesapeake Bay. Virginia Department of Game and Inland Fisheries, Nongame and Endangered Wildlife Program, Technical Report No. 1.
- Watts, B. D., M. D. Wilson, and D. S. Bradshaw. 1997. Habitat requirements of early successional bird communities: Management implications for mid-Atlantic region. Center for Conservation Biology Technical Report, CCBTR-97-03. College of William and Mary, Williamsburg, VA. 62 pp.
- Watts, B. D. 1999. Partners in Flight Mid-Atlantic Coastal Plain Bird Conservation Plan (Physiographic Area #44). Center for Conservation Biology. College of William and Mary. Williamsburg, VA 81 pp.
- Watts, B. D. 2000. Management of park fields to enhance natural resource value and biodiversity of Colonial National Historic Park. Center for Conservation Biology, College of William and Mary, Williamsburg, VA. 23 pp.
- Watts, B. D. and M. A. Byrd. 2003. Virginia bald eagle nest and productivity survey: Year 2003 report. Center for Conservation Biology Technical Report Series, CCBTR-03-03. College of William and Mary, Williamsburg, VA. 26 pp.
- Watts, B. D. and M. A. Byrd. 2005. Virginia bald eagle nest and productivity survey: Year 2005 report. Center for Conservation Biology Technical Report Series, CCBTR-05-05. College of William and Mary, Williamsburg, VA. 27 pp.

- Watts, B. D. and Parsons Transportation Group Inc. of Virginia. 2006. Biological Assessment for bald eagle, Route 624 bridge replacement, Cat Point Creek. Virginia Department of Transportation, Richmond, VA. 35 pp.
- Watts, B. D., xx Mitchell. 2007.
- Watts, B. D., G. D. Therres, and M. A. Byrd. In press. Status, distribution, and the future bald eagles in the Chesapeake Bay Area. Center for Conservation Biology, College of William and Mary, Williamsburg, and Maryland Department of Natural Resources, Wildlife and Heritage Service, Annapolis, MD.
- Weaver, Alan. 2003. Va Department of Game and Inland Fisheries Fish Passage Coordinator. in Historic Shad Stocking in the Rappahannock River: People, Land, and Water, Department of the Interior.
- Westmoreland County, 2006. Webpage for Westmoreland County, Virginia. <http://co.westmoreland.va.us>.
- White, C. P. 1989. Chesapeake Bay Field Guide: Nature of the Estuary. Tidewater Publishers. Centreville, MD. 224 pp.
- Williams, B. K., R. C. Szaro, C. D. Shapiro. 2007 Adaptive Management: The U.S. Department of the Interior Technical Guide. Adaptive Management Working Group. U.S. Department of the Interior. Washington DC.
- Williams, J. P., Jr. 1993. Chesapeake Almanac. Tidewater Publishers. Centerville, Md. 236 pp.
- Wilson, E. O. 1992. The Diversity of Life. Harvard University Press. New York. 424 pp.
- Wilson, I. T. and T. Tuberville. 2003. Virginia's Precious Heritage: A Report on the Status of Virginia's Natural Communities, Plants, and Animals, and a Plan for Preserving Virginia's Natural Heritage Resources. Natural Heritage Technical Report 03-15. Virginia Department of Conservation and Recreation, Division of Natural Heritage, 217 Governor Street, 3rd Floor, Richmond, VA. 82 pp plus appendices.
- Wise, S. and B. W. Buchanan. 2002. The influence of artificial illumination on moths. In Proceedings of the Urban Wildlands Group, Ecological consequences of artificial night lighting, February 23-24, 2002. Los Angeles, CA. Catherine Rich & Travis Longcore, Conference Co-Chairs.
- WSSA. 1994. Herbicide handbook. Weed Society of America. Champaign, Illinois. 352 pp.

Appendix A



USFWS

Eastern tailed-blue butterfly

Species Known or Suspected on the Refuge, Including Species of Conservation Concern

Table A.1. Birds of Conservation Concern for Rappahannock River Valley National Wildlife Refuge

Species & Local Status	Scientific Name	2005 State WAP ¹	BCR 30 2007 ²	Audubon Watch List ³	Habitat Type (In Project Area)
American Bittern (B?, M)	<i>Botaurus lentiginosus</i>	Tier II	Moderate	**	Emergent Wetland
American Black Duck (B?, M, W)	<i>Anas rubripes</i>	Tier II	Highest	X **	Open water
American Woodcock (B, M, W)	<i>Scolopax minor</i>	Tier IV	Highest	X	Deciduous Forest
Bald Eagle (B, M, W)	<i>Haliaeetus leucocephalus</i>	Tier II	Moderate		Riparian
Baltimore Oriole (B?, M)	<i>Icterus galbula</i>		High		Riparian
Barn Owl (B, W)	<i>Tyto alba</i>	Tier III			Vegetated Open
Bicknell's Thrush (M)	<i>Catharus bicknelli</i>	Tier IV	High	X	Mixed Forest
Black-billed Cuckoo (B, M)	<i>Coccyzus erythrophthalmus</i>			**	Deciduous Forest
Blackburnian Warbler (M)	<i>Dendroica fusca</i>		Moderate		Mixed Forest
Black and White Warbler (B, M)	<i>Mniotiltia varia</i>	Tier IV	High	**	Coniferous Forest
Black-crowned Night-Heron (B, M)	<i>Nycticorax nycticorax</i>	Tier III			Wooded Wetland
Brown-headed Nuthatch	<i>Sitta pusilla</i>	Tier IV	Moderate		Coniferous Forest
Blue-winged Warbler (M)	<i>Vermivora pinus</i>		Highest	X	Shrub, Successional
Brant (W)	<i>Circus cyaneus</i>	Tier III		X	Open Water
Broad-winged Hawk (M)	<i>Buteo platypterus</i>		High		Mixed Forest, Wooded Wetland
Brown Thrasher (B, M, W)	<i>Toxostoma rufum</i>	Tier IV	High		Deciduous Forest
Brown-headed Nuthatch	<i>Sitta pusilla</i>	Tier IV	Moderate	X	Coniferous Forest
Canada Warbler (M)			Moderate	X	Mixed Forest, Shrub Successional
Cerulean Warbler (M)	<i>Dendroica cerulean</i>	Tier II	Moderate	X	Deciduous Forest
Chimney Swift (B, M)	<i>Chaetura Pelagica</i>	Tier IV	High		Mixed Forest
Chuck-Will's Widow (B, M)	<i>Caprimulgus Carolinensis</i>	Tier IV			Mixed, Coniferous, & Deciduous Forests
Coastal Plain Swamp Sparrow (B, M)	<i>Melospiza georgiana nigrescens</i>		Moderate		Shrubby Wetland
Common Snipe (M, W)	<i>Gallinago gallinago</i>		Moderate		Emergent Wetland
Common Tern (M)	<i>Sterna hirundo</i>	Tier III	Moderate		Emergent Wetland, Barren
Dickcissel (B, M)	<i>Spiza americana</i>			X	Grassland, Vegetated Open
Eastern Kingbird (B, M)	<i>Tyranus tyrannus</i>	Tier IV	High		Shrub, Vegetated Open

Species & Local Status	Scientific Name	2005 State WAP ¹	BCR 30 2007 ²	Audubon Watch List ³	Habitat Type (In Project Area)
Eastern Meadowlark (B, M, W)	<i>Sturnella Magna</i>	Tier IV		**	Vegetated Open
Eastern Towhee (B, M, W)	<i>Pipilo erythrophthalmus</i>	Tier IV	High		Mixed, Coniferous & Deciduous Forest
Eastern Wood-Peevee (B, M)	<i>Contopus virens</i>	Tier IV			Wooded Wetland, Vegetated Open
Field Sparrow (B, M, W)	<i>Spizella pusilla</i>	Tier IV	High	**	Scrub, Vegetated Open
Forster's Tern (M)	<i>Sterna forsteri</i>	Tier IV	High		Emergent Wetland
Grasshopper Sparrow (B, M)	<i>Ammodramus savannanum</i>	Tier IV	Moderate		Vegetated Open
Gray Catbird (B, M, W)	<i>Dumetella carolinensis</i>	Tier IV	Moderate	**	Wooded Wetland, Shrub, Vegetated Open
Great-crested Flycatcher (B, M)	<i>Myiarchus crinitus</i>		High		Mixed Forest
Greater Scaup (W)	<i>Aythya marila</i>	Tier IV	High		Open Water
Greater Yellowlegs (B, M, W)	<i>Tringa melanleuca</i>		High		Emergent Wetland
Green Heron (B, M, W?)	<i>Butorides striatus</i>	Tier IV		**	Wooded Wetland, Emergent Wetland
Kentucky Warbler (B, M)	<i>Oporomis formosus</i>	Tier IV	High	X	Mixed, Coniferous & Deciduous Forests
Killdeer (B, M, W)	<i>Charadrius vociferus</i>		Moderate		Open, Beach
King Rail (B, M)	<i>Rallus elegans</i>	Tier II	Moderate		Emergent Wetland
Least Bittern (B, M)	<i>Ixobrychus exilis</i>	Tier III	Moderate		Emergent Wetland
Lesser Yellowlegs (B?, M)	<i>Tringa flavipes</i>		Moderate		Emergent Wetland
Louisiana Waterthrush (B, M)	<i>Seiurus motacilla</i>	Tier IV	High		Mixed & Deciduous Forests
Marsh Wren (B, M, W)	<i>Cistothorus palustris</i>	Tier IV	High		Emergent Wetland
Northern Bobwhite (B, W)	<i>Colinus virginianus</i>	Tier IV	High	**	Vegetated Open
Northern Harrier (M, W)	<i>Circus cyaneus</i>	Tier III			Emergent Wetland, Vegetated Open
Northern Flicker (B, W)	<i>Colaptes auratus</i>		High	**	Deciduous Forest, Mixed Forest
Northern Parula (B, M)	<i>Parula americana</i>	Tier IV			Mixed Forest, Wooded Wetland
Northern Rough-winged Swallow (B, M)	<i>Stelgidopteryx serripennis</i>	Tier IV			Vegetated Open
Ovenbird (B, M)	<i>Seiurus aurocapillus</i>	Tier IV			Mixed, Coniferous & Deciduous Forests

Species & Local Status	Scientific Name	2005 State WAP ¹	BCR 30 2007 ²	Audubon Watch List ³	Habitat Type (In Project Area)
Peregrine Falcon (B, M)	<i>Falco peregrinus</i>	Tier I			Mixed, Coniferous & Deciduous Forests
Prairie Warbler (B, M)	<i>Dendroica discolor</i>	Tier IV	Highest	X	Mixed, Coniferous & Deciduous Forests
Prothonotary warbler (B, M)	<i>Protonotaria citrea</i>	Tier IV	High	X	Wooded Wetland
Redhead (W)	<i>Aythya americana</i>	Tier III			Open water
Red-headed Woodpecker (B, M, W)	<i>Melanerpes eurythrocephalus</i>		Moderate	X **	Mixed, Coniferous, & Deciduous Forests, Wooded Wetland
Rose-breasted Grosbeak (M)	<i>Pheuctitus ludovicianus</i>	Tier IV			Mixed Forest
Royal Tern (summer)	<i>Sterna maxima</i>	Tier II	Moderate		Open Water
Rusty Blackbird (M, W)	<i>Euphagus carolinus</i>	Tier IV	High	X **	Wooded Wetland, Vegetated Open
Scarlet Tanager (B, M)	<i>Piranga olivacea</i>	Tier IV	High		Wooded Wetland, Mixed & Deciduous Forests
Seaside Sparrow (B, M)	<i>Ammodramus maritimus</i>	Tier IV	Highest	X	Emergent Wetland
Sedge Wren (M)	<i>Cistothorus platensis</i>	Tier III	Moderate		Emergent Wetland, Shrubby Wetland
Short-eared Owl (M, W)	<i>Asio flammeus</i>		Moderate	X	Grassland, Vegetated Open
Solitary Sandpiper (B, M)	<i>Tringa solitaria</i>		High		Emergent wetland, Riparian Beach
Spotted Sandpiper (B, M)	<i>Actitis macularius</i>		Moderate		Riparian/Beach
Swainson's Warbler (M)	<i>Limnothylops swainsonii</i>	Tier II	Moderate	X	Deciduous Forests
Virginia Rail (B, M)	<i>Rallus limicola</i>	Tier IV			Emergent Wetland
Whip-Poor-Will (B, M)	<i>Caprimulgus vociferous</i>	Tier IV	Moderate		Mixed & Deciduous Forests, Vegetated Open
Willow Flycatcher (B, M)	<i>Empidonax traillii</i>	Tier IV	Moderate	X	Wooded Wetland, Deciduous Forest
Wood Thrush (B, M)	<i>Hylocichla mustelina</i>	Tier IV	Highest	X	Wooded Wetland, Shrub, Vegetated Open, Mixed & Deciduous Forests
Worm-eating Warbler (B, M)	<i>Helmitheros vermivorus</i>	Tier IV	High	X	Wooded Wetland, Mixed, Coniferous & Deciduous Forests
Yellow-billed Cuckoo (B, M)	<i>Coccyzus americanus</i>	Tier IV			Wooded Wetland, Shrub, Vegetated Open, Mixed & Deciduous Forests

Species & Local Status	Scientific Name	2005 State WAP ¹	BCR 30 2007 ²	Audubon Watch List ³	Habitat Type (In Project Area)
Yellow-Breasted Chat (B, M)	<i>Icteria virens</i>	Tier IV			Mixed, Coniferous & Deciduous Forests, Shrub, Vegetated Open
Yellow-throated Vireo (B, M)	<i>Vireo flavifrons</i>	Tier IV	High		Wooded Wetland, Coniferous & Deciduous Forests
Yellow Warbler (B, M)	<i>Dendroica petechia</i>	Tier IV		**	Mixed & Deciduous Forest

**Note: See Table A-3 for further details on ranking criteria for State and Federal plans

¹State WAP Definitions:

Tier I = critical conservation need;
Tier II = very high conservation need;
Tier III = high conservation need;
Tier IV = moderate conservation need

²BCR 30 2007 Definitions:

Highest = High BCR Concern and High BCR Responsibility and (High or Moderate Continental Concern);
High = High Continental Concern and Moderate BCR Responsibility

OR Moderate BCR Concern and High BCR Responsibility OR High BCR Concern and Moderate BCR Responsibility OR Non-breeding High Continental Concern species whose primary area of spring or fall migration overlaps the BCR;

Moderate = Moderate BCR Concern and Moderate BCR responsibility

OR High Continental Concern and Low BCR Responsibility OR High BCR Concern and Low BCR Responsibility and Regionally Threatened Species (PIF Tier IIC) OR High BCR Responsibility and Low BCR Concern OR Sub-species of Regional Importance

³The Audubon Watch list comes from two sources: The 2002 Audubon Watch List; and the Audubon State of the Birds Report for Virginia. In the Audubon Watch list column:

“X” represents a bird species on The 2002 Audubon Watch List

“***” represents a bird species that breeds or likely breeds in the project area and are declining at ≥70% per year over the past 40 years.

Sources for the Conservation List Used for This Table:

1. State of VA WAP (Wildlife Action Plan) of Virginia Department of Game and Inland Fisheries. 2005. Virginia's Comprehensive Wildlife Conservation Strategy (from Chapter 4: Species of Greatest Conservation Need in Virginia's Coastal Plain) VDGIF, Richmond, VA;
2. The 2002 Audubon Watch List. <http://www.audubon2.org/watchlist/viewWatchlist.jsp>. Accessed August 17, 2007.
3. All Common Virginia Birds Declining Greater than 50% over 40 Years on the BBS or CBC. <http://stateofthebirds.audubon.org/cbid/>
4. Steinkamp, M. 2007. BCR 30 Plan. Conservation priority categories for bird species in BCR 30. ACGV. (June 18 draft).

Table A.2. Species List for Rappahannock River Valley Area

Common Name	Scientific Name	Federal and State Status ¹	State Wildlife Action Plan Rank ²	Confirmed by Fwis ³	Confirmed by Refuge ⁴
PART 1: BIRDS					
LOONS					
Common Loon	<i>Gavia immer</i>				Yes
Red-throated Loon	<i>Gavia stellata</i>				Yes
GREBES					
Horned Grebe	<i>Podiceps auritus</i>		Tier IV		Yes
Pied-billed Grebe	<i>Podilymbus podiceps</i>			No	Yes
PELICANS					
Brown Pelican	<i>Pelecanus occidentalis</i>	SSC			
CORMORANTS					
Double-crested Cormorant	<i>Phalacrocorax auritus</i>			No	Yes
HERONS, EGRETS, AND BITTERNS					
American Bittern	<i>Botaurus lentiginosus</i>		Tier II	Yes	Yes
Black-crowned Night-heron	<i>Nycticorax nycticorax</i>		Tier III		Yes
Cattle Egret	<i>Bubulcus ibis</i>			No	
Great Blue Heron	<i>Ardea herodias herodias</i>			Yes	Yes
Great Egret	<i>Ardea alba egretta</i>	SSC		No	Yes
Green Heron	<i>Butorides virescens</i>		Tier IV	No	Yes
Least Bittern	<i>Ixobrychus exilis exilis</i>		Tier III	No	Yes
Yellow-crowned Night-heron	<i>Nyctanassa violacea violacea</i>	SSC	Tier II	No	Yes
DUCKS, GEESE, AND SWANS					
American Black Duck	<i>Anas rubripes</i>		Tier II	No	Yes
American Goldfinch	<i>Carduelis tristis</i>			No	Yes
American Wigeon	<i>Anas americana</i>			No	Yes
Blue-winged Teal	<i>Anas discors orphan</i>			No	Yes
Bufflehead	<i>Bucephala albeola</i>			No	Yes
Canada Goose	<i>Branta canadensis</i>			No	Yes
Canvasback	<i>Aythya valisineria</i>			No	Yes
Common Goldeneye	<i>Bucephala clangula americana</i>			No	Yes
Common Merganser	<i>Mergus merganser americanus</i>			No	Yes
Gadwall	<i>Anas strepera</i>			No	Yes
Greater Scaup	<i>Aythya marila</i>		Tier IV	No	Yes
Green-winged Teal	<i>Anas crecca carolinensis</i>			No	Yes
Hooded Merganser	<i>Lophotydes cucullatu</i>				Yes

Common Name	Scientific Name	Federal and State Status ¹	State Wildlife Action Plan Rank ²	Confirmed by Fwis ³	Confirmed by Refuge ⁴
Lesser Scaup	<i>Aythya affinis</i>			No	Yes
Long-tailed Duck	<i>Clangula hyemalis</i>			No	Yes
Mallard	<i>Anas platyrhynchos</i>			No	Yes
Mute Swan	<i>Cygnus olor</i>				Yes
Northern Pintail	<i>Anas acuta acuta</i>			No	
Northern Shoveler	<i>Anas clypeata</i>				Yes
Red-Breasted Merganser	<i>Mergus serrator serrator</i>			No	Yes
Redhead	<i>Aythya americana</i>		Tier III	No	
Ring-necked Duck	<i>Aythya collaris</i>				Yes
Ruddy Duck	<i>Oxyura jamaicensis</i>			No	Yes
Snow Goose	<i>Chen caerulescens</i>			No	Yes
Tundra Swan	<i>Cygnus columbianus columbianus</i>			No	Yes
Wood Duck	<i>Aix sponsa</i>			No	Yes
RAPTORS					
American Kestrel	<i>Falco sparverius sparverius</i>			No	Yes
Bald Eagle	<i>Haliaeetus leucocephalus</i>	ST	Tier II	Yes	Yes
Black Vulture	<i>Coragyps atratus</i>			No	Yes
Broad-winged Hawk	<i>Buteo platypterus</i>			No	Yes
Cooper's Hawk	<i>Accipiter cooperii</i>			No	Yes
Merlin	<i>Falco columbarius</i>				Yes
Northern Harrier	<i>Circus cyaneus</i>	SSC	Tier III	No	Yes
Osprey	<i>Pandion haliaetus carolinensis</i>			Yes	Yes
Peregrine Falcon	<i>Falco peregrinus</i>				Yes
Red-shouldered Hawk	<i>Buteo lineatus lineatus</i>			No	Yes
Red-tailed Hawk	<i>Buteo jamaicensis</i>			No	Yes
Rough-legged Hawk	<i>Buteo lagopus johannis</i>			No	Yes
Sharp-shinned Hawk	<i>Accipiter striatus velox</i>			No	Yes
Turkey Vulture	<i>Cathartes aura</i>			No	Yes
TURKEY AND QUAIL					
Northern Bobwhite	<i>Colinus virginianus</i>		Tier IV	No	Yes
Wild Turkey	<i>Meleagris gallopavo silvestris</i>			No	Yes
RAILS AND COOTS					
American Coot	<i>Fulica americana</i>			No	Yes
Black Rail	<i>Laterallus jamaicensis</i>	SOC	Tier I	No	Yes
Clapper Rail	<i>Rallus longirostris</i>		Tier IV		Poss
Common Moorhen	<i>Gallinula chloropus cachinnans</i>	SSC		No	Yes

Common Name	Scientific Name	Federal and State Status ¹	State Wildlife Action Plan Rank ²	Confirmed by Fwis ³	Confirmed by Refuge ⁴
King Rail	<i>Rallus elegans</i>		Tier II	No	Yes
Sora Rail	<i>Porzana carolina</i>				Yes
Virginia Rail	<i>Rallus limicola</i>		Tier IV	No	Yes
SHOREBIRDS					
American Woodcock	<i>Scolopax minor</i>		Tier IV	No	Yes
Dunlin	<i>Calidris alpina</i>		Tier IV		Yes
Greater Yellowlegs	<i>Tringa melanoleuca</i>				Yes
Killdeer	<i>Charadrius vociferus</i>			No	Yes
Least Sandpiper	<i>Calidris minutilla</i>				Yes
Lesser Yellowlegs	<i>Tringa flavipes</i>				Yes
Pectoral Sandpiper	<i>Calidris melanotos</i>				
Semipalmated Plover	<i>Charadrius semipalmatus</i>				Yes
Short-billed Dowitcher	<i>Limnodromus griseus</i>		Tier IV	No	
Solitary Sandpiper	<i>Tringa solitaria</i>				Yes
Spotted Sandpiper	<i>Actitis macularia</i>			No	Yes
Stilt Sandpiper	<i>Calidris himantopus</i>				Yes
Upland Sandpiper	<i>Bartramia longicauda</i>	ST		No	
Wilson's (Common) Snipe	<i>Gallinago delictata</i>			No	Yes
GULLS AND TERNS					
Black Tern	<i>Chlidonias niger</i>				Yes
Bonaparte's Gull	<i>Larus philadelphia</i>				Yes
Caspian Tern	<i>Sterna caspia</i>	SSC		No	Yes
Common Tern	<i>Sterna hirundo</i>		Tier III		Yes
Forster's Tern	<i>Sterna forsteri</i>	SSC	Tier IV	No	Yes
Great Black-backed Gull	<i>Larus marinus</i>			No	Yes
Herring Gull	<i>Larus argentatus</i>			No	Yes
Laughing Gull	<i>Larus atricilla</i>			No	Yes
Least Tern	<i>Sterna antillarum</i>	SSC	Tier II	No	Yes
Ring-billed Gull	<i>Larus delawarensis</i>			No	Yes
Royal Tern	<i>Sterna maxima maxima</i>		Tier II	No	Yes
PIGEONS AND DOVES					
Mourning Dove	<i>Zenaida macroura carolinensis</i>			No	Yes
Rock Pigeon	<i>Columba livia</i>			No	Yes
CUCKOOS					
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>			No	Yes
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>		Tier IV	No	Yes

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OWLS					
Barn Owl	<i>Tyto alba pratincola</i>	SSC	Tier III	No	Yes
Barred Owl	<i>Strix varia</i>			No	Yes
Eastern Screech Owl	<i>Megascops asio</i>			No	Yes
Great-horned Owl	<i>Bubo virginianus</i>			No	Yes
Long-eared Owl	<i>Asio otus</i>	SSC			Yes
Short-eared Owl	<i>Asio flammeus</i>			No	Yes
NIGHTHAWKS AND NIGHTJARS					
Chuck-will's-widow	<i>Caprimulgus carolinensis</i>		Tier IV	No	Yes
Common Nighthawk	<i>Chordeiles minor</i>			No	Yes
Whip-poor-will	<i>Caprimulgus vociferus</i>		Tier IV	No	Yes
SWIFTS					
Chimney Swift	<i>Chaetura pelagica</i>		Tier IV	No	Yes
HUMMINGBIRDS					
Ruby-throated Hummingbird	<i>Archilochus colubris</i>			No	Yes
KINGFISHERS					
Belted Kingfisher	<i>Ceryle alcyon</i>			No	Yes
WOODPECKERS					
Downy Woodpecker	<i>Picoides pubescens medianus</i>			No	Yes
Hairy Woodpecker	<i>Picoides villosus</i>			No	Yes
Northern Flicker	<i>Colaptes auratus</i>			No	Yes
Pileated Woodpecker	<i>Dryocopus pileatus</i>			No	Yes
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>			No	Yes
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>			No	Yes
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>			No	Yes
FLYCATCHERS					
Acadian Flycatcher	<i>Empidonax virescens</i>			No	Yes
Eastern Kingbird	<i>Tyrannus tyrannus</i>		Tier IV	No	Yes
Eastern Phoebe	<i>Sayornis phoebe</i>			No	Yes
Eastern Wood Pewee	<i>Contopus virens</i>		Tier IV	No	Yes
Great-crested Flycatcher	<i>Myiarchus crinitus</i>			No	Yes
Least Flycatcher	<i>Empidonax minimus</i>				Yes
Willow Flycatcher	<i>Empidonax traillii</i>		Tier IV		Yes
Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>	SSC			Yes

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VIREOS					
Blue-headed Vireo	<i>Vireo solitarius</i>				Yes
Red-eyed Vireo	<i>Vireo olivaceus</i>			No	Yes
Warbling Vireo	<i>Vireo gilvus</i>				Yes
White-eyed Vireo	<i>Vireo griseus</i>			No	Yes
Yellow-throated Vireo	<i>Vireo flavifrons</i>		Tier IV	No	Yes
CROWS AND JAYS					
American Crow	<i>Corvus brachyrhynchos</i>			No	Yes
Blue Jay	<i>Cyanocitta cristata</i>			No	Yes
Common Grackle	<i>Quiscalus quiscula</i>			No	Yes
Fish Crow	<i>Corvus ossifragus</i>			No	Yes
LARKS					
Horned Lark	<i>Eremophila alpestris</i>			No	Yes
SWALLOWS AND MARTINS					
Bank Swallow	<i>Riparia riparia</i>			No	Yes
Barn Swallow	<i>Hirundo rustica</i>			No	Yes
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>				Yes
Northern Rough-Winged Swallow	<i>Stelgidopteryx serripennis</i>		Tier IV	No	Yes
Purple Martin	<i>Progne subis</i>			No	Yes
Tree Swallow	<i>Tachycineta bicolor</i>			No	Yes
CHICKADEES AND TITMICE					
Carolina Chickadee	<i>Poecile carolinensis</i>			No	Yes
Eastern Tufted Titmouse	<i>Baeolophus bicolor</i>			No	Yes
NUTHATCHES					
Brown-headed Nuthatch	<i>Sitta pusilla</i>		Tier IV	No	Yes
Red-breasted Nuthatch	<i>Sitta canadensis</i>	SSC		No	Yes
White-breasted Nuthatch	<i>Sitta carolinensis</i>			No	Yes
CREEPERS					
Brown Creeper	<i>Certhia americana</i>	SSC		No	Yes
WRENS					
Carolina Wren	<i>Thryothorus ludovicianus</i>			No	Yes
House Wren	<i>Troglodytes aedon</i>			No	Yes
Marsh Wren	<i>Cistothorus palustris</i>		Tier IV	No	Yes
Sedge Wren	<i>Cistothorus platensis</i>	SSC	Tier III	No	Yes
Winter Wren	<i>Troglodytes troglodytes</i>	SSC		No	Yes

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KINGLETS					
Golden-crowned Kinglet	<i>Regulus satrapa</i>	SSC		No	Yes
Ruby-crowned Kinglet	<i>Regulus calendula</i>			No	Yes
GNATCATCHERS					
Blue-gray Gnatcatcher	<i>Poliophtila caerulea</i>			No	Yes
THRUSHES					
American Robin	<i>Turdus migratorius</i>			No	Yes
Bicknell's Thrush	<i>Catharus bicknelli</i>		Tier IV		Yes
Eastern Bluebird	<i>Sialia sialis</i>			No	Yes
Gray-cheeked Thrush	<i>Catharus minimus</i>				Yes
Hermit Thrush	<i>Catharus guttatus</i>	SSC		No	Yes
Swainson's Thrush	<i>Catharus ustulatus</i>				Yes
Veery	<i>Catharus fuscescens</i>				Yes
Wood Thrush	<i>Hylocichla mustelina</i>		Tier IV	No	Yes
MOCKINGBIRDS AND THRASHERS					
Brown Thrasher	<i>Toxostoma rufum</i>		Tier IV	No	Yes
Gray Catbird	<i>Dumetella carolinensis</i>		Tier IV	No	Yes
Northern Mockingbird	<i>Mimus polyglottos</i>			No	Yes
STARLINGS					
European Starling	<i>Sturnus vulgaris</i>			No	Yes
PIPITS					
American Pitpit	<i>Anthus rubescens</i>			No	Yes
WAXWINGS					
Cedar Waxwing	<i>Bombycilla cedrorum</i>			No	Yes
WARBLERS					
American Redstart	<i>Setophaga ruticilla</i>			No	Yes
Bay-breasted Warbler	<i>Dendroica castanea</i>				Yes
Black-and-White Warbler	<i>Mniotilta varia</i>			No	Yes
Blackburnian Warbler	<i>Dendroica fusca</i>				Yes
Blackpoll Warbler	<i>Dendroica striata</i>			No	Yes
Black-throated Blue Warbler	<i>Dendroica caerulescens</i>			No	Yes
Black-throated Green Warbler	<i>Dendroica virens</i>			No	Yes
Blue-winged Warbler	<i>Vermivora pinus</i>			No	Yes

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Canada Warbler	<i>Wilsonia canadensis</i>			No	Yes
Cape May Warbler	<i>Dendroica tigrina</i>				Yes
Cerulean Warbler	<i>Dendroica cerulea</i>	SOC	Tier II	No	Yes
Chestnut-sided Warbler	<i>Dendroica pensylvanica</i>			No	Yes
Common Yellowthroat	<i>Geothlypis trichas</i>			No	Yes
Hooded Warbler	<i>Wilsonia citrina</i>			No	Yes
Kentucky Warbler	<i>Oporornis formosus</i>		Tier IV	No	Yes
Louisiana Waterthrush	<i>Seiurus motacilla</i>			No	Yes
Magnolia Warbler	<i>Dendroica magnolia</i>	SSC		No	Yes
Mourning Warbler	<i>Oporornis philadelphia</i>	SSC			Yes
Nashville Warbler	<i>Vermivora ruficapilla</i>			No	Yes
Northern Waterthrush	<i>Seiurus noveboracensis</i>			No	Yes
Northern Parula	<i>Parula americana</i>		Tier IV	No	Yes
Olive Warbler	<i>Peucedramus taeniatus</i>				Yes
Orange-crowned Warbler	<i>Vermivora celata</i>				Yes
Ovenbird	<i>Seiurus aurocapilla</i>		Tier IV	No	Yes
Palm Warbler	<i>Dendroica palmarum</i>			No	Yes
Pine Warbler	<i>Dendroica pinus</i>			No	Yes
Prairie Warbler	<i>Dendroica discolor</i>		Tier IV	No	Yes
Prothonotary Warbler	<i>Protonotaria citrea</i>		Tier IV	No	Yes
Swainson's Warbler	<i>Limnithlypis swainsonii</i>	SSC	Tier II		Yes
Worm-eating Warbler	<i>Helmitheros vermivorus</i>		Tier IV	No	Yes
Yellow Warbler	<i>Dendroica petechia</i>		Tier IV	No	Yes
Yellow-breasted Chat	<i>Icteria virens virens</i>		Tier IV	No	Yes
Yellow-rumped Warbler	<i>Dendroica coronata cornata</i>			No	Yes
Yellow-throated Warbler	<i>Dendroica dominica</i>			No	Yes
TANAGERS					
Scarlet Tanager	<i>Piranga olivacea</i>		Tier IV	No	Yes
Summer Tanager	<i>Piranga rubra</i>			No	Yes
NEW WORLD SPARROWS					
American Tree Sparrow	<i>Spizella arborea</i>				Yes
Chipping Sparrow	<i>Spizella passerina</i>			No	Yes
Clay-colored Sparrow	<i>Spizella pallida</i>				Yes
Coastal Plain Swamp Sparrow	<i>Melospiza georgiana nigrescens</i>				Yes
Dark-eyed Junco	<i>Junco hyemalis</i>			No	Yes

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Eastern Towhee	<i>Pipilo erythrophthalmus</i>		Tier IV	No	Yes
Field Sparrow	<i>Spizella pusilla</i>		Tier IV	No	Yes
Fox Sparrow	<i>Passerella iliaca</i>			No	Yes
Grasshopper Sparrow	<i>Ammodramus savannarum pratensis</i>		Tier IV	No	Yes
LeConte's Sparrow	<i>Ammodramus leconteii</i>				Yes
Lincoln's Sparrow	<i>Melospiza lincolni</i>				Yes
Savannah Sparrow	<i>Passerculus sandwichensis</i>			No	Yes
Seaside Sparrow	<i>Ammodramus maritimus</i>		Tier IV	No	Yes
Song Sparrow	<i>Melospiza melodia</i>			No	Yes
Swamp Sparrow	<i>Melospiza georgiana</i>			No	Yes
Vesper Sparrow	<i>Poocetes gramineus</i>			No	Yes
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>			No	Yes
White-throated Sparrow	<i>Zonotrichia albicollis</i>			No	Yes
CARDINALS AND ALLIES					
Blue Grosbeak	<i>Guiraca caerulea caerulea</i>			No	Yes
Dickcissel	<i>Spiza americana</i>	SSC		No	Yes
Indigo Bunting	<i>Passerina cyanea</i>			No	Yes
Northern Cardinal	<i>Cardinalis cardinalis</i>			No	Yes
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>		Tier IV		Yes
BLACKBIRDS, ORIOLES, AND ALLIES					
Baltimore Oriole	<i>Icterus galbula</i>			No	Yes
Bobolink	<i>Dolichonyx oryzivorus</i>				Yes
Brown-headed Cowbird	<i>Molothrus ater</i>			No	Yes
Eastern Meadowlark	<i>Sturnella magna</i>		Tier IV	No	Yes
Orchard Oriole	<i>Icterus spurius</i>			No	Yes
Red-winged Blackbird	<i>Agelaius phoeniceus</i>			No	Yes
Rusty Blackbird	<i>Euphagus carolinus</i>		Tier IV		Yes
FINCHES AND ALLIES					
Common Redpoll	<i>Carduelis flammea</i>				Yes
House Finch	<i>Carpodacus mexicanus</i>			No	Yes
Purple Finch	<i>Carpodacus purpureus</i>	SSC		No	Yes
White-winged Crossbill	<i>Loxia leucoptera</i>			No	
OLD WORLD SPARROWS					
House Sparrow	<i>Passer domesticus</i>			No	Yes

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PART 2: MAMMALS					
Bat, big brown	<i>Eptesicus fuscus fuscus</i>			No	
Bat, eastern red	<i>Lasiurus borealis borealis</i>			No	
Bat, evening	<i>Nycticeius humeralis humeralis</i>			No	
Bat, hoary	<i>Lasiurus cinereus cinereus</i>			No	
Bat, little brown	<i>Myotis lucifugus lucifugus</i>			No	
Bat, silver-haired	<i>Lasionycteris noctivagans</i>			No	
Beaver, American	<i>Castor canadensis</i>			No	Yes
Bobcat	<i>Lynx rufus rufus</i>			No	Yes
Chipmunk, Fisher's eastern	<i>Tamias striatus fisheri</i>			No	
Cottontail, eastern	<i>Sylvilagus floridanus mallurus</i>			No	Yes
Coyote	<i>Canis latrans</i>			No	
Deer, white-tailed	<i>Odocoileus virginianus</i>			No	Yes
Fox, common gray	<i>Urocyon cinereoargenteus cinereoargenteus</i>			No	Yes
Fox, red	<i>Vulpes vulpes fulva</i>			No	Yes
Mink, common	<i>Mustela vison mink</i>			No	Yes
Mole, eastern	<i>Scalopus aquaticus aquaticus</i>			No	Yes
Mole, star-nosed	<i>Condylura cristata cristata</i>			No	Yes
Mouse, eastern harvest	<i>Reithrodontomys humulis virginianus</i>			No	
Mouse, house	<i>Mus musculus musculus</i>			No	Yes
Mouse, meadow jumping	<i>Zapus hudsonius americanus</i>			No	
Mouse, northern white-footed	<i>Peromyscus leucopus noveboracensis</i>			No	Yes
Muskrat, large-toothed	<i>Ondatra zibethicus macrodon</i>			No	Yes
Myotis, northern	<i>Myotis septentrionalis septentrionalis</i>			No	
Opossum, Virginia	<i>Didelphis virginiana virginiana</i>			No	Yes
Otter, northern river	<i>Lontra canadensis lataxina</i>	SSC		No	Yes
Pipistrelle, eastern	<i>Pipistrellus subflavus subflavus</i>			No	
Raccoon	<i>Procyon lotor lotor</i>			No	Yes
Rat, marsh rice	<i>Oryzomys palustris palustris</i>			No	

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Rat, Norway	<i>Rattus norvegicus norvegicus</i>			No	
Shrew, Kirtland's short-tailed	<i>Blarina brevicauda kirtlandi</i>			No	
Shrew, least	<i>Cryptotis parva parva</i>			No	Yes
Shrew, pygmy	<i>Sorex hoyi winnemana</i>			No	
Shrew, southeastern	<i>Sorex longirostris longirostris</i>			No	
Shrew, southern short-tailed	<i>Blarina carolinensis carolinensis</i>			No	Yes
Skunk, striped	<i>Mephitis mephitis</i>			No	Yes
Squirrel, northern gray	<i>Sciurus carolinensis pennsylvanicus</i>			No	Yes
Squirrel, southern flying	<i>Glaucomys volans volans</i>			No	Yes
Squirrel, talkative red	<i>Tamiasciurus hudsonicus loquax</i>			No	
Vole, dark meadow	<i>Microtus pennsylvanicus nigrans</i>			No	
Vole, meadow	<i>Microtus pennsylvanicus pennsylvanicus</i>			No	Yes
Vole, pine	<i>Microtus pinetorum scalopsoides</i>			No	
Weasel, long-tailed	<i>Mustela frenata noveboracensis</i>			No	
Woodchuck	<i>Marmota monax monax</i>			No	Yes
PART 3: AMPHIBIANS					
Bullfrog	<i>Lithobates catesbeiana</i>			No	Yes
Frog, Brimley's chorus	<i>Pseudacris brimleyi</i>			No	
Frog, southern cricket	<i>Acris crepitans crepitans</i>			No	Yes
Frog, northern green	<i>Lithobates clamitans melanota</i>			No	Yes
Frog, pickerel	<i>Lithobates palustris</i>			No	Yes
Frog, southern leopard	<i>Lithobates sphenocephala</i>			No	Yes
Frog, upland chorus	<i>Pseudacris feriarum feriarum</i>			No	Yes
Frog, wood	<i>Lithobates sylvatica</i>			No	Yes
Newt, red-spotted	<i>Notophthalmus viridescens viridescens</i>			No	Yes
Peeper, northern spring	<i>Pseudacris crucifer crucifer</i>			No	Yes
Salamander, eastern mud	<i>Pseudotriton montanus montanus</i>		Tier IV	No	
Salamander, four-toed	<i>Hemidactylium scutatum</i>			No	
Salamander, marbled	<i>Ambystoma opacum</i>			No	Yes

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Salamander, northern dusky	<i>Desmognathus fuscus</i>			No	
Salamander, northern red	<i>Pseudotriton ruber ruber</i>			No	
Salamander, northern red-backed	<i>Plethodon cinereus</i>			No	Yes
Salamander, southern two-lined	<i>Eurycea cirrigera</i>			No	Yes
Salamander, spotted	<i>Ambystoma maculatum</i>			No	Yes
Salamander, three-lined	<i>Eurycea guttolineata</i>			No	
Salamander, white-spotted slimy	<i>Plethodon cylindraceus</i>			No	Yes
Siren, greater	<i>Siren lacertina</i>		Tier IV	No	
Spadefoot, eastern	<i>Scaphiopus holbrooki</i>		Tier IV	No	
Toad, American	<i>Anaxyrus americanus</i>			No	Yes
Toad, eastern narrow-mouthed	<i>Gastrophryne carolinensis</i>			No	
Toad, Fowler's	<i>Anaxyrus fowleri</i>			No	Yes
Treefrog, Cope's gray	<i>Hyla chrysoscelis</i>			No	Yes
Treefrog, green	<i>Hyla cinerea</i>			No	Yes
PART 4: REPTILES					
Brownsnake, northern	<i>Storeria dekayi dekayi</i>			No	
Copperhead, northern	<i>Agkistrodon contortrix mokasen</i>			No	Yes
Cornsnake, red	<i>Elaphe guttata</i>			No	
Earthsnake, eastern smooth	<i>Virginia valeriae valeriae</i>			No	
Gartersnake, eastern	<i>Thamnophis sirtalis sirtalis</i>			No	Yes
Greensnake, northern rough	<i>Opheodrys aestivus aestivus</i>			No	Yes
Kingsnake, eastern	<i>Lampropeltis getula getula</i>			No	Yes
Kingsnake, mole	<i>Lampropeltis calligaster rhombomaculata</i>			No	
Lizard, eastern fence	<i>Sceloporus undulatus</i>			No	Yes
Milksnake, eastern	<i>Lampropeltis triangulum triangulum</i>			No	
Racer, northern black	<i>Coluber constrictor constrictor</i>			No	Yes
Racerunner, six-lined	<i>Cnemidophorus sexlineatus sexlineatus</i>			No	
Ratsnake, black	<i>Elaphe obsoleta obsoleta</i>			No	Yes
Ribbonsnake, common	<i>Thamnophis sauritus sauritus</i>		Tier IV	No	Yes

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Scarletsnake, northern	<i>Cemophora coccinea copei</i>		Tier IV	No	
Skink, broadhead	<i>Eumeces laticeps</i>			No	
Skink, five-lined	<i>Eumeces fasciatus</i>			No	Yes
Skink, little brown	<i>Scincella lateralis</i>			No	
Skink, southeastern five-lined	<i>Eumeces inexpectatus</i>			No	
Snake, common rainbow	<i>Farancia erythrogramma erythrogramma</i>			No	Yes
Snake, eastern hog-nosed	<i>Heterodon platirhinos</i>		Tier IV	No	Yes
Snake, northern red-bellied	<i>Storeria occipitomaculata occipitomaculata</i>			No	
Snake, northern ring-necked	<i>Diadophis punctatus edwardsii</i>			No	Yes
Turtle, Stinkpot (Musk)	<i>Sternotherus odoratus</i>			No	Yes
Cooter, northern red-bellied	<i>Pseudemys rubriventris rubriventris</i>			No	Yes
Turtle, eastern box	<i>Terrapene carolina carolina</i>		Tier III	No	Yes
Turtle, eastern mud	<i>Kinosternon subrubrum subrubrum</i>			No	Yes
Turtle, eastern painted	<i>Chrysemys picta picta</i>			No	Yes
Turtle, eastern snapping	<i>Chelydra serpentina serpentina</i>			No	Yes
Turtle, spotted	<i>Clemmys guttata</i>		Tier III	No	Yes
Turtle, striped mud	<i>Kinosternon baurii</i>			No	
Watersnake, northern	<i>Nerodia sipedon sipedon</i>			No	Yes
Wormsnake, eastern	<i>Carphophis amoenus amoenus</i>			No	Yes
PART 5: FISH					
Alewife	<i>Alosa pseudoharengus</i>		Tier IV	Yes	Yes
Bass, largemouth	<i>Micropterus salmoides</i>			Yes	Yes
Bass, smallmouth	<i>Micropterus dolomieu</i>			No	
Bass, striped	<i>Morone saxatilis</i>			No	Yes
Bluegill	<i>Lepomis macrochirus</i>			No	Yes
Bowfin	<i>Amia calva</i>			Yes	Yes
Bullhead, brown	<i>Ameiurus nebulosus</i>			Yes	Yes
Bullhead, yellow	<i>Ameiurus natalis</i>			No	Yes
Carp, common	<i>Cyprinus carpio</i>			Yes	Yes
Catfish, blue	<i>Ictalurus furcatus</i>			Yes	Yes
Catfish, channel	<i>Ictalurus punctatus</i>			Yes	Yes
Catfish, white	<i>Ameiurus catus</i>			Yes	
Chubsucker, creek	<i>Erimyzon oblongus</i>			Yes	Yes

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Crappie, black	<i>Pomoxis nigromaculatus</i>			No	
Dace, blacknose	<i>Rhinichthys atratulus</i>			No	
Darter, tessellated	<i>Etheostoma olmstedii</i>			Yes	Yes
Eel, American	<i>Anguilla rostrata</i>		Tier IV	Yes	Yes
Fallfish	<i>Semotilus corporalis</i>			No	
Gar, longnose	<i>Lepisosteus osseus</i>			Yes	Yes
Herring, blueback	<i>Alosa aestivalis</i>			Yes	Yes
Killifish, banded	<i>Fundulus diaphanus</i>			Yes	
Lamprey, Least Brook	<i>Lampetra aepyptera</i>		Tier IV		Yes
Madtom, margined	<i>Noturus insignis</i>			No	Yes
Madtom, tadpole	<i>Noturus gyrinus</i>			No	Yes
Minnow, eastern silvery	<i>Hybognathus regius</i>			Yes	Yes
Mosquitofish, eastern	<i>Gambusia holbrooki</i>			No	Yes
Mudminnow, eastern	<i>Umbra pygmaea</i>			No	Yes
Perch, pirate	<i>Aphredoderus sayanus sayanus</i>			No	Yes
Perch, white	<i>Morone americana</i>			Yes	Yes
Perch, yellow	<i>Perca flavescens</i>			Yes	Yes
Pickereel, chain	<i>Esox niger</i>			Yes	Yes
Pickereel, redbfin	<i>Esox americanus americanus</i>			No	Yes
Pumpkinseed	<i>Lepomis gibbosus</i>			Yes	Yes
Shad, American	<i>Alosa sapidissima</i>		Tier IV	Yes	Yes
Shad, gizzard	<i>Dorosoma cepedianum</i>			Yes	Yes
Shad, hickory	<i>Alosa mediocris</i>			No	
Shiner, common	<i>Luxilus cornutus</i>			No	
Shiner, golden	<i>Notemigonus crysoleucas</i>			Yes	Yes
Shiner, ironcolor	<i>Notropis chalybaeus</i>		Tier IV	No	
Shiner, satinfin	<i>Cyprinella analostana</i>			No	Yes
Shiner, spottail	<i>Notropis hudsonius</i>			No	
Shiner, swallowtail	<i>Notropis procne</i>			No	Yes
Silverside, inland	<i>Menidia beryllina</i>			Yes	
Sturgeon, Atlantic	<i>Acipenser oxyrinchus</i>	SOC, SSC	Tier II	No	Yes
Sturgeon, Shortnose	<i>Acipenser brevirostrum</i>	FE, SE	Tier I		Yes
Sunfish, bluespotted	<i>Enneacanthus gloriosus</i>			Yes	Yes
Sunfish, mud	<i>Acantharchus pomotis</i>		Tier IV	No	
Sunfish, Bluegill	<i>Lepomis macrochirus</i>				Yes
Sunfish, redbreast	<i>Lepomis auitus</i>			No	Yes
Warmouth	<i>Lepomis gulosus</i>			No	Yes

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PART 6: OTHER AQUATIC SPECIES					
Crayfish	<i>Fallicambarus uhleri</i>			No	
Crayfish	<i>Fallicambarus fodiens</i>			No	
Crayfish, devil	<i>Cambarus diogenes diogenes</i>			No	
Crayfish, no common name	<i>Cambarus acuminatus</i>			No	
Crayfish, spiny cheek	<i>Orconectes limosus</i>			No	
Crayfish, white river	<i>Procambarus acutus</i>			No	
Mussel, eastern elliptio	<i>Elliptio complanata</i>			No	
PART 7: MOTHS AND BUTTERFLIES					
Armyworm	<i>Pseudaletia unipuncta</i>			No	
Borer, European corn	<i>Ostrinia nubilatis</i>			No	
Butterfly, American lady	<i>Vanessa virginiensis</i>				Yes
Butterfly, Aaron's skipper	<i>Poanes aaroni</i>			No	
Butterfly, Appalachian brown	<i>Satyrodes appalachia</i>			No	
Butterfly, Black Swallowtail	<i>Papilio polyxenes</i>				Yes
Butterfly, Brazilian skipper	<i>Calpododes ethlius</i>			No	
Butterfly, broad-winged skipper	<i>Poanes viator</i>			No	
Butterfly, cabbage white	<i>Pieris rapae</i>			No	Yes
Butterfly, Carlina satyr	<i>Hermeuptychia sosybius</i>				Yes
Butterfly, carus skipper	<i>Polites carus</i>			No	
Butterfly, clouded skipper	<i>Lerema accius</i>			No	
Butterfly, clouded sulphur	<i>Colias philodice</i>			No	Yes
Butterfly, cloudless sulphur	<i>Phoebis sennae eubule</i>			No	Yes
Butterfly, common buckeye	<i>Junonia coenia</i>			No	Yes
Butterfly, common wood-nymph	<i>Cercyonis pegala</i>			No	Yes
Butterfly, crossline skipper	<i>Polites origenes</i>			No	
Butterfly, Delaware skipper	<i>Anatrytone logan</i>			No	

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Butterfly, eastern tailed-blue	<i>Everes comyntas</i>			No	Yes
Butterfly, eastern tiger swallowtail	<i>Papilio glaucus</i>			No	Yes
Butterfly, Edwards hairstreak	<i>Satyrium edwardsii</i>			No	
Butterfly, falcate orangetip	<i>Anthocharis midea</i>			No	Yes
Butterfly, gray hairstreak	<i>Strymon melinus</i>			No	Yes
Butterfly, great spangled fritillary	<i>Speyeria cybele</i>			No	Yes
Butterfly, hackberry emperor	<i>Asterocampa celtis</i>			No	
Butterfly, Hayhurst's scalloppwing	<i>Staphylus hayhurstii</i>			No	
Butterfly, Horace's duskywing	<i>Erynnis noratius</i>				Yes
Butterfly, least skipper	<i>Ancyloxypha numitor</i>			No	Yes
Butterfly, long-tailed skipper	<i>Urbanus proteus</i>			No	
Butterfly, meadow fritillary	<i>Bolonia bellona</i>				Yes
Butterfly, monarch	<i>Danaus plexippus</i>			No	Yes
Butterfly, Northern broken dash	<i>Wallengrenia egeremet</i>				Yes
Butterfly, orange sulphur	<i>Colias eurytheme</i>			No	Yes
Butterfly, Pearl Crescent	<i>Phyciodes tharos</i>				Yes
Butterfly, Peck's skipper	<i>Polites peckius</i>			No	
Butterfly, Pipevine swallowtail	<i>Battus philenor</i>				Yes
Butterfly, Question mark	<i>Polygonia interrogationis</i>				Yes
Butterfly, Rare Skipper	<i>Problema bulenta</i>	SOC			
Butterfly, Red Admiral	<i>Vanessa atalanta</i>				Yes
Butterfly, red-spotted purple	<i>Limenitis arthemis astyanax</i>			No	Yes
Butterfly, sachem	<i>Atalopedes campestris</i>			No	
Butterfly, salt marsh skipper	<i>Panoquina panoquin</i>			No	
Butterfly, silver-spotted skipper	<i>Epargyreus clarus</i>			No	Yes

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Butterfly, southern cloudywing	<i>Thorybes bathyllus</i>			No	
Butterfly, southern hairstreak	<i>Satyrium favonius</i>			No	
Butterfly, spicebush swallowtail	<i>Papilio troilus</i>			No	Yes
Butterfly, spring azure	<i>Celastrina ladon</i>			No	
Butterfly, swarthy skipper	<i>Nastra lherminier</i>			No	
Butterfly, tawny emperor	<i>Asterocampa clyton</i>			No	
Butterfly, variegated fritillary	<i>Euptoieta claudia</i>				
Butterfly, viceroy	<i>Limenitis archippus</i>			No	Yes
Butterfly, zebra swallowtail	<i>Eurytides marcellus</i>			No	Yes
Earworm, corn	<i>Heliathis zea</i>			No	
Moth, cecropia	<i>Hyalophora cecropia</i>				Yes
Moth, codling	<i>Cydia pomonella</i>			No	
Moth, green-striped mapleworm	<i>Cryocampa rubicunda</i>				Yes
Moth, gypsy	<i>Lymantria dispar</i>			No	
Moth, Imperial	<i>Eacles imperialis</i>				Yes
Moth, Luna	<i>Actias luna</i>				Yes
Moth, Plebeian sphinx	<i>Paratrea plebeja</i>			No	Yes
Moth, Polyphemus	<i>Antheraea polyphemus</i>				Yes
Moth, royal walnut moth	<i>Citheronia regalis</i>				Yes
Moth, Virginia-creeper sphinx	<i>Darapsa myron</i>			No	Yes
Moth, sycamore tussock	<i>Halysidoat harrisii</i>				Yes
Moth, tulip-tree	<i>Callosamia angulifera</i>				Yes
PART 8: TICKS					
Tick, American dog	<i>Dermacentor variabilis</i>			No	
Tick, brown dog	<i>Rhipicephalus sanguineus</i>			No	
Tick, lone star	<i>Amblyomma americanum</i>			No	Yes
Tick, rabbit	<i>Haemaphysalis leporispalustris</i>			No	
Tick, winter	<i>Dermacentor albipictus</i>			No	
PART 9: DRAGONFLIES					
Banded pennant	<i>Celithemis fasciata</i>				Yes
Black-mantled glider	<i>Tramea lacerata</i>				Yes
Blue dasher	<i>Pachydiplax longipennis</i>				Yes

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Blue-fronted dancer	<i>Argia apicalis</i>				Yes
Calico pennant	<i>Celithemis elisa</i>				Yes
Common green darner	<i>Anax junius</i>				Yes
Common whitetail	<i>Libellula lydia</i>				Yes
Dragonhunter	<i>Hagenius brevistylus</i>				Yes
Eastern amberwing	<i>Perithemis tenera</i>				Yes
Eastern forktail	<i>Ischnura verticalis</i>				Yes
Eastern pondhawk	<i>Erythemis simplicicollis</i>				Yes
Ebony jewelwing	<i>Calopteryx maculata</i>				Yes
Familiar bluet	<i>Enallagma civile</i>				Yes
Four-spotted pennant	<i>Brachymesia gravida</i>				Yes
Fragile forktail	<i>Ischnura posita</i>				Yes
Great blue skimmer	<i>Libellula vibrans</i>				Yes
Halloween pennant	<i>Celithemis eponina</i>				Yes
Needham's skimmer	<i>Libellula needhami</i>				Yes
Painted skimmer	<i>Libellula semifasciata</i>				Yes
Pied skimmer	<i>Libellula luctuosa</i>				Yes
Prince baskettail	<i>Epithea princeps</i>				Yes
Royal river cruiser	<i>Macromia taeniolata</i>				Yes
Saddlebag spp	<i>Tamea spp.</i>				Yes
Seaside dragonlet	<i>Erythrodiplax berenice</i>				Yes
Slaty skimmer	<i>Libellula incesta</i>				Yes
Twin-spotted spiketail	<i>Cordulegaster maculata</i>				Yes
Violet-masked glider	<i>Tamea carolina</i>				Yes
White-spangled skimmer	<i>Libellula cyanea</i>				Yes
Widow skimmer	<i>Libellula luctuosa</i>				Yes
PART 10: BEETLES					
American carrion beetle	<i>Sylpha americana</i>				Yes
Black pine sawyer	<i>Monochamus scutellatus</i>				Yes
Common black ground beetle	<i>Pterostichus spp.</i>				Yes
Dogbane leaf beetle	<i>Chryochus auratus</i>				Yes
Eastern eyed click beetle	<i>Alaus oculatus</i>				Yes
Hercules beetle	<i>Dynastes tityus</i>				Yes
Ivory marked beetle	<i>Eburia quadrigeminata</i>				Yes
Ladybug beetle	<i>Hippodamia spp</i>				Yes
Longhorn beetle spp	<i>Family Cerambycidae</i>				Yes
Patent leather beetle	<i>Odontotaenius disjunctus</i>				Yes
Pennsylvania firefly	<i>Photuris pennsylvanicus</i>				Yes

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Red milkweed beetle	<i>Tetraopes tetraophthalmus</i>				Yes
Stag beetle spp.	<i>Family Lucanidea</i>				Yes
Tarnished plant bug	<i>Lygus lineolaris</i>				Yes
Tiger beetle spp	<i>Cincidelidae spp</i>				Yes
Wood borer spp.	<i>Family Buprestidae</i>				Yes
PART 11: BEES					
	<i>Agapostemon virescens</i>				Yes
	<i>Augochlora pura</i>				Yes
	<i>Augochlorella aurata</i>				Yes
	<i>Bombus griseocollis</i>				Yes
	<i>Halictus ligatus/poevi</i>				Yes
	<i>Hylaeus affinis/modestus</i>				Yes
	<i>Lasioglossum bruneri</i>				Yes
	<i>Lasioglossum coreopsis</i>				Yes
	<i>Lasioglossum creberrimum</i>				Yes
	<i>Lasioglossum versatumsensumitchell</i>				Yes
	<i>Melissodes bimaculata</i>				Yes
	<i>Melissodes comptoides</i>				Yes
	<i>Melissodes denticulata</i>				Yes
	<i>Ptilothrix bombiformis</i>				Yes
	<i>Svastra atripes</i>				Yes
	<i>Triepeolus lunatus</i>				Yes
PART 12: PLANTS					
FORBS					
Common Yarrow	<i>Achillea millefolium</i>				Yes
Sensitive Joint Vetch	<i>Aeschynomene virginica</i>	FT, ST		Yes	Yes
White Snakeroot	<i>Ageratina altissima</i>				Yes
Onion species	<i>Allium sp.</i>				Yes
Ragweed	<i>Ambrosia altissimiflora</i>				Yes
Anemone species	<i>Anemone sp.</i>				Yes
Pussytoes	<i>Antennaria plantaginifolia</i>				Yes
Stinking Chamomile (Dog Fennel)	<i>Anthemis cotula</i>				Yes
Jack in the Pulpit	<i>Arisaema triphyllum</i>				Yes
Milkweed species	<i>Asclepias L. sp.</i>				Yes
Swamp Milkweed	<i>Asclepius incarnata</i>				Yes
Common Milkweed	<i>Asclepius syriaca</i>				Yes
St. Andrews Cross	<i>Ascyrum hypercoides</i>				Yes

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Ebony Spleenwort	<i>Asplenium platyneuron</i>				Yes
Aster species	<i>Aster sp.</i>				Yes
Common Lady Fern	<i>Athyrium filix-femina</i>				Yes
Beggar Ticks	<i>Bidens leavis</i>				Yes
False nettle	<i>Bohemeria cylindrica</i>				Yes
Cutleaf Grapefern	<i>Botrychium dissectum</i>				Yes
Lambsquarters	<i>Chenopodium album</i>				Yes
Spotted Wintergreen	<i>Chimaphila maculata</i>				Yes
Canada Thistle	<i>Cirsium arvense</i>				Yes
Virginia Springbeauty	<i>Claytonia virginica</i>				Yes
Blue Mistflower	<i>Conoclinium coelestinum</i>				Yes
Canadian Horseweed	<i>Conyza canadensis</i>				Yes
Lanceleaf Tickseed	<i>Coreopsis lanceolata</i>				Yes
Pink Ladyslipper	<i>Cypripedium acaule</i>				Yes
Queen Anne's Lace	<i>Daucus carota</i>				Yes
Eastern Hayscented Fern	<i>Dennstaedtia punctilobula</i>				Yes
Nakedflower Ticktrefoil	<i>Desmodium nudiflorum</i>				Yes
Panicledleaf Ticktrefoil	<i>Desmodium paniculatum</i>				Yes
Wild Yam	<i>Dioscorea villosa</i>				Yes
Woodfern species	<i>Dryopteris sp.</i>				Yes
Eastern Purple Coneflower	<i>Echinacea purpurea</i>				Yes
Field Horsetail	<i>Equisetum arvense</i>				Yes
Fireweed	<i>Erechtites hieraciifolia</i>				Yes
Eastern Daisy Fleabane	<i>Erigeron annuus</i>				Yes
Coastal Plain Joe Pye Weed	<i>Eupatoriadelphus dubius</i>				Yes
Common Boneset	<i>Eupatorium perfoliatum</i>				Yes
Bedstraw species	<i>Galium sp.</i>				Yes
Eastern Teaberry	<i>Gaultheria procumbens</i>				Yes
Closed Gentian	<i>Gentiana clausa</i>				Yes
Soybean	<i>Glycine max</i>				Yes
Rattlesnake Plantain	<i>Goodyera pubescens</i>				Yes
American False Pennyroyal	<i>Hedeoma pulegioides</i>				Yes
Maximilian Sunflower	<i>Helianthus maximiliani</i>				Yes
Swamp Pink	<i>Helonias bullata</i>	FT, SE			Potential (perDNH)
Virginia heartleaf	<i>Hexastylus virginica</i>				Yes

Species Known or Suspected on the Refuge, Including Species of Conservation Concern

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Crimson-eyed rosemallow	<i>Hibiscus moscheutos</i>				Yes
St. Johnswort species	<i>Hypericum sp.</i>				Yes
Jewelweed/ Touch-me-not species	<i>Impatiens capensis</i>				Yes
Pale yellow Iris	<i>Iris pseudacorus</i>				Yes
Small Whorled Pogonia	<i>Isotria medioloides</i>	FT, SE			Potential (perDNH)
Sericea Lespedeza	<i>Lespedeza cuneata</i>				Yes
Turk's-cap Lily	<i>Lilium superbum</i>				Yes
Twayblade, large	<i>Liparis liliifolia</i>				Yes
Cardinal Flower	<i>Lobelia cardinalis</i>				Yes
Running Clubmoss	<i>Lycopodium clavatum</i>				Yes
Fan Clubmoss	<i>Lycopodium digitatum</i>				Yes
Clubmoss species	<i>Lycopodium sp.</i>				Yes
Maleberry	<i>Lyonia ligustrina</i>				Yes
Indian Cucumber-root	<i>Medeola virginiana</i>				Yes
Wild Cucumber	<i>Melothria pendula</i>				Yes
Partridgeberry	<i>Mitchella repens</i>				Yes
Bee Balm	<i>Monarda didyma</i>				Yes
Sensitive Fern	<i>Onoclea sensibilis</i>				Yes
Pricklypear species	<i>Opuntia sp.</i>				Yes
Cinnamon Fern	<i>Osmunda cinnamomea</i>				Yes
Royal Fern	<i>Osmunda regalis</i>				Yes
Violet Wood Sorrel	<i>Oxalis violacea</i>				Yes
American Ginseng	<i>Panax quinquefolius</i>	SE			Yes
Arrow Arum	<i>Peltandra virginica</i>				Yes
Eastern Smooth Beard Tongue	<i>Penstemon laevigatus</i>				Yes
Clammy Groundcherry	<i>Physalis heterophylla</i>				Yes
American Pokeweed	<i>Phytolacca americana</i>				Yes
Eastern Prairie Fringed Orchid	<i>Platanthera leucophaea</i>	FT, ST			Yes
Mayapple	<i>Podophyllum peltatum</i>				Yes
Solomon's Seal	<i>Polygonatum commutatum</i>				Yes
Halberdleaf Tearthumb	<i>Polygonum arifolium</i>				Yes
Japanese Knotweed	<i>Polygonum cuspidatum</i>				Yes
Dotted Smartweed	<i>Polygonum punctatum</i>				Yes
Arrowleaf Tearthumb	<i>Polygonum sagittatum</i>				Yes
Smartweed species	<i>Polygonum sp.</i>				Yes
Jumpseed	<i>Polygonum virginianum</i>				Yes

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Christmas Fern	<i>Polystichum acrostichoides</i>				Yes
Cinquefoil species	<i>Potentilla L. cinquefoil s</i>				Yes
Swamp Rose	<i>Rosa palustris</i>				Yes
Blackeyed Susan	<i>Rudbeckia hirta</i>				Yes
Common Sheep Sorrel	<i>Rumex acetosella</i>				Yes
Dock species	<i>Rumex sp.</i>				Yes
Arrowhead species	<i>Sagittaria sp.</i>				Yes
Lyreleaf Sage	<i>Salvia lyrata</i>				Yes
Lizard's Tail	<i>Saururus cernuus</i>				Yes
Skullcap species	<i>Scutellaria sp.</i>				Yes
Tall Goldenrod	<i>Solidago altissima</i>				Yes
Hyssop-leaved Goldenrod	<i>Solidago hyssopifolia</i>				Yes
Sweet Goldenrod	<i>Solidago odora</i>				Yes
Goldenrod species	<i>Solidago sp.</i>				Yes
Sphagnum moss species	<i>Sphagnum sp.</i>				Yes
Dropseed species	<i>Sporobolus sp.</i>				Yes
Chickweed species	<i>Stellaria sp.</i>				Yes
New York Fern	<i>Thelypteris noveboracensis</i>				Yes
Fern species	<i>Thelypteris sp.</i>				Yes
Red Clover	<i>Trifolium pratense</i>				Yes
Venus Looking Glass species	<i>Triodanis sp.</i>				Yes
Yellowfruit Horse-gentian	<i>Triosteum angustifolium</i>				Yes
Narrowleaf Cattail	<i>Typha angustifolia</i>				Yes
Cattail species	<i>Typha sp.</i>				Yes
Perfoliate Bellwort	<i>Uvularia perfoliata</i>				Yes
White Vervain	<i>Verbena urticifolia</i>				Yes
Vetch species	<i>Vicia sp.</i>				Yes
Netted Chainfern	<i>Woodwardia areolata</i>				Yes
Chainfern species	<i>Woodwardia sp.</i>				Yes
GRASSES AND SEDGES					
Big Bluestem	<i>Andropogon gerardii</i>				Yes
Broomsedge Bluestem	<i>Andropogon virginicus</i>				Yes
Indianhemp	<i>Apocynum cannabinum</i>				Yes
Sideoats Grama	<i>Bouteloua curtipendula</i>				Yes
Sweet Woodreed	<i>Cinna arundinacea</i>				Yes
Bermuda Grass	<i>Cynodon dactylon</i>				Yes
Orchardgrass	<i>Dactylis glomerata</i>				Yes

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Deertongue	<i>Dichanthelium clandestinum</i>				Yes
Sand Lovegrass species	<i>Eragrostis sp.</i>				Yes
Fescue species	<i>Festuca sp.</i>				Yes
Rice Cutgrass	<i>Leersia oryzoides</i>				Yes
Japanese Stiltgrass	<i>Microstegium vimineum</i>				Yes
Switchgrass	<i>Panicum virgatum</i>				Yes
Common Reed	<i>Phragmites australis</i>				Yes
Annual bluegrass	<i>Poa annua</i>				Yes
Little Bluestem	<i>Schizachyrium scoparius</i>				Yes
Foxtail species	<i>Setaria sp.</i>				Yes
Indiangrass	<i>Sorghastrum nutans</i>				Yes
Johnsongrass	<i>Sorghum halepense</i>				Yes
Saltmeadow Cordgrass	<i>Spartina patens</i>				Yes
Prairie Cordgrass	<i>Spartina pectinata</i>				Yes
Eastern Gamagrass	<i>Tripsacum dactyloides</i>				Yes
Corn	<i>Zea mays</i>				Yes
Giant Cutgrass	<i>Zizaniopsis miliacea</i>				Yes
Lurid Sedge	<i>Carex lurida</i>				Yes
Sedge species	<i>Carex sp.</i>				Yes
Needlegrass Rush	<i>Juncus roemerianus</i>				Yes
Rush species	<i>Juncus sp.</i>				Yes
Leafy Bulrush	<i>Scirpus polyphyllus</i>				Yes
Bulrush species	<i>Scirpus sp.</i>				Yes
SHRUBS AND TREES					
Alder species	<i>Alnus sp.</i>				Yes
Devil's Walkingstick	<i>Aralia spinosa</i>				Yes
Eastern Baccharis	<i>Baccharis halimifolia</i>				Yes
Common Buttonbush	<i>Cephalanthus occidentalis</i>				Yes
Sweet Pepperbush	<i>Clethra alnifolia</i>				Yes
Autumn Olive	<i>Elaeagnus umbellata</i>				Yes
Bursting-heart	<i>Euonymus americanus</i>				Yes
Huckleberry species	<i>Gaylussacia sp.</i>				Yes
American Witchhazel	<i>Hamamelis virginiana</i>				Yes
Common Winterberry	<i>Ilex verticillata</i>				Yes
Mountain Laurel	<i>Kalmia latifolia</i>				Yes
Fetterbush	<i>Leucothoe racemosa</i>				Yes
Privet	<i>Ligustrum sp.</i>				Yes
Wax Myrtle	<i>Myrica cerifera</i>				Yes
Great Laurel	<i>Rhododendron maximum</i>				Yes

Common Name	Scientific Name	Federal and State Status ¹	State Wildlife Action Plan Rank ²	Confirmed by Fwis ³	Confirmed by Refuge ⁴
Swamp Azalea	<i>Rhododendron viscosum</i>				Yes
Winged Sumac	<i>Rhus copallinum</i>				Yes
Smooth Sumac	<i>Rhus glabra</i>				Yes
Sumac species	<i>Rhus sp.</i>				Yes
Staghorn Sumac	<i>Rhus typhina</i>				Yes
Blackberry species	<i>Rubus spp.</i>				Yes
Elderberry	<i>Sambucus canadensis</i>				Yes
Lowbush Blueberry	<i>Vaccinium angustifolium</i>				Yes
Highbush Blueberry	<i>Vaccinium corymbosum</i>				Yes
Creeping Blueberry	<i>Vaccinium crassifolium</i>				Yes
Blueberry species	<i>Vaccinium sp.</i>				Yes
Deerberry	<i>Vaccinium stamineum</i>				Yes
Southern Arrowwood	<i>Viburnum dentatum</i>				Yes
Blackhaw Viburnum	<i>Viburnum prunifolium</i>				Yes
Red Maple	<i>Acer rubrum</i>				Yes
Buckeye species	<i>Aesculus sp.</i>				Yes
Tree of Heaven	<i>Ailanthus altissima</i>				Yes
Silktree (Mimosa)	<i>Albizia julibrissin</i>				Yes
Canadian Serviceberry	<i>Amelanchier canadensis</i>				Yes
Serviceberry	<i>Amelanchier sp.</i>				Yes
Pawpaw	<i>Asimina triloba</i>				Yes
River Birch	<i>Betula nigra</i>				Yes
American Hornbeam	<i>Carpinus caroliniana</i>				Yes
Hickory species	<i>Carya sp.</i>				Yes
Hackberry species	<i>Celtis sp.</i>				Yes
Eastern Redbud	<i>Cercis canadensis</i>				Yes
Flowering Dogwood	<i>Cornus florida</i>				Yes
Common Persimmon	<i>Diospyros virginiana</i>				Yes
American Beech	<i>Fagus grandifolia</i>				Yes
Green Ash	<i>Fraxinus pennsylvanica</i>				Yes
American Holly	<i>Ilex opaca</i>				Yes
Black Walnut	<i>Juglans nigra</i>				Yes
Eastern Redcedar	<i>Juniperus virginiana</i>				Yes
Northern Spicebush	<i>Lindera benzoin</i>				Yes
Sweetgum	<i>Liquidambar styraciflua</i>				Yes
Tuliptree, Tulip Poplar	<i>Liriodendron tulipifera</i>				Yes
Sweetbay	<i>Magnolia virginiana</i>				Yes
Mulberry species	<i>Morus sp.</i>				Yes
Black Gum	<i>Nyssa sylvatica</i>				Yes
Sourwood	<i>Oxydendrum arboreum</i>				Yes

Common Name	Scientific Name	Federal and State Status ¹	State Wildlife Action Plan Rank ²	Confirmed by Fwis ³	Confirmed by Refuge ⁴
Princesstree	<i>Paulownia tomentosa</i>				Yes
Loblolly Pine	<i>Pinus taeda</i>				Yes
Virginia Pine	<i>Pinus virginiana</i>				Yes
American Sycamore	<i>Platanus occidentalis</i>				Yes
Eastern Cottonwood	<i>Populus deltoides</i>				Yes
Black Cherry	<i>Prunus serotina</i>				Yes
White Oak	<i>Quercus alba</i>				Yes
Scarlet Oak	<i>Quercus coccinea</i>				Yes
Southern Red Oak	<i>Quercus falcata</i>				Yes
Overcup Oak	<i>Quercus lyrata</i>				Yes
Swamp Chestnut Oak	<i>Quercus michauxii</i>				Yes
Water Oak	<i>Quercus nigra</i>				Yes
Pin Oak	<i>Quercus palustris</i>				Yes
Willow Oak	<i>Quercus phellos</i>				Yes
Chestnut Oak	<i>Quercus prinus</i>				Yes
Northern Red Oak	<i>Quercus rubra</i>				Yes
Black Oak	<i>Quercus velutina</i>				Yes
Black Locust	<i>Robinia pseudoacacia</i>				Yes
Black Willow	<i>Salix nigra</i>				Yes
Sassafras	<i>Sassafras albidum</i>				Yes
Bald Cypress	<i>Taxodium distichum</i>				Yes
Elm species	<i>Ulmus sp.</i>				Yes
VINES					
Trumpet Creeper	<i>Campsis radicans</i>				Yes
Field Bindweed	<i>Convolvulus arvensis</i>				Yes
Redstar	<i>Ipomoea coccinea</i>				Yes
Japanese Honeysuckle	<i>Lonicera japonica</i>				Yes
Climbing Hempvine	<i>Mikania scandens</i>				Yes
Virginia Creeper	<i>Parthenocissus quinquefolia</i>				Yes
Yellow Passionflower	<i>Passiflora lutea</i>				Yes
Multiflora Rose	<i>Rosa multiflora</i>				Yes
Greenbrier, Catbriar	<i>Smilax rotundifolia</i>				Yes
Poison Ivy	<i>Toxicodendron radicans</i>				Yes
Grape species	<i>Vitis sp.</i>				Yes

¹FE = Federal Endangered;
FT = Federal Threatened;
FC = Federal Candidate;
SOC = Federal Species of Concern (not a legal status; list maintained by USFWS Virginia Field Office);
SE = State Endangered;
ST = State Threatened;
GCN = Greatest Conservation Need and Tiers I-IV from State Wildlife Action Plan;
SSC = State Special Concern (not a legal status); Virginia Division of Natural Heritage Program ranking from: (1) critically imperiled to demonstrably secure (5) at the global (G), national (N) or state (S) level.

²Tier 1 = Critical need, extremely high risk of extinction or extirpation.
Tier II = Very high conservation need.
Tier III = High conservation need.
Tier IV = Moderate conservation need. For more detailed information regarding these categories, please refer to table A.3.

³FWIS - Fish and Wildlife Information Service; The following list was compiled from the Virginia Fish and Wildlife Information Services (FWIS) database (2003 version) for the Rappahannock River—Cat Point Creek area and includes additional species from Refuge surveys and other trusted sources. Species with blanks in the “Confirmed by FWIS” column are additions to the FWIS list by Sandy Spencer, Refuge Biologist. A “no” in this column means the State has no voucher for this species as of the date of the FWIS list.

⁴Observed by Service staff or their representatives on the refuge or within the approved refuge acquisition boundary

Contributors:

Insecta: Ann Chazel, Connie Grimm, Teta Kain, Sandy Spencer, Va Tech (CMI).

Avifauna: Bob Ake, Fred Atwood, Arun Bose, Steve Collins, Thelma Dalmas, Fenton Day, John Drummond, Teta Kain, Daniel Lee, John Spahr, Sandy Spencer, Mike Stinson, Bill Williams, Mike Wilson.

Mammalia: Refuge staff.

Aquatic: Gary Swihart, VCU.

Herpetofauna: Mike Clifford, Connie Grimm, Don Schwab, Sandy Spencer, Kory Steele, Joy Ware (other members of the Virginia Herpetological Society).

Plants: Allen Belden, Marie Minor, Sandy Spencer

Table A.3. Conservation List and Agency, Tier Categories, and Definition

Conservation List	Categories	Criteria or Rule
Virginia Wildlife Action Plan (2005) ¹	Tier I	<u>Critical need.</u> Extremely high risk of extinction or extirpation. Populations are at critically low levels, face immediate threat(s), or occur within an extremely limited range. Intense and immediate management action is needed.
	Tier II	<u>Very high conservation need.</u> High risk of extinction or extirpation. Populations of these species are at very low levels, face real threat(s), or occur within a very limited distribution. Immediate management is needed for stabilization and recovery.
	Tier III	<u>High conservation need.</u> Extinction or extirpation possible. Populations are in decline, have declined to low levels, or are restricted in their range. Management action is needed to stabilize or increase these populations.
	Tier IV	<u>Moderate conservation need.</u> Species may be rare in parts of its range, particularly in the periphery. Populations of these species have demonstrated a declining trend, or a declining trend is suspected, which, if continued, is likely to qualify the species for a higher trend in the foreseeable future. Long term planning is necessary to stabilize or increase populations.
Partners in Flight (PIF): Mid-Atlantic Coastal Plain (Area 44) Bird Conservation Assessment (2004) ²	Tier IA	<u>High Continental Concern and High Regional Responsibility.</u> Species for which this region shares in major conservation responsibility (i.e. conservation in this region is critical to the overall health of this species).
	Tier IB	<u>High Continental Concern and Low Regional Responsibility.</u> Species for which this region can contribute to range-wide conservation objectives where the species occurs.
	Tier IIA	<u>High Regional Concern.</u> Species that are experiencing declines in the core of their range and that require short-term conservation action to reverse or stabilize trends.
	Tier IIB	<u>High Regional Responsibility.</u> Species for which this region shares in the responsibility for long-term conservation, even if they are not currently declining or threatened. These are species of moderate overall priority with a disproportionately high percentage of their total population in the region.
	Tier IIC	<u>High Regional Threats.</u> Species of moderate overall priority that are uncommon in a region and whose remaining populations are threatened, usually because of extreme threats to sensitive habitats. These are species with high breeding threat scores within the region, or in combination with high non-breeding threats outside the region.
	Tier III	<u>Additional Watch List.</u> These species are on the U.S. National Watch List not included in the above tiers. These species score highly enough based on global criteria to warrant conservation attention wherever they occur in bird conservation regions with high area importance factors. This factor is based on two components: relative density in the region, and the proportion of the global population of a species that is contained within the region during the breeding season.
	Tier IV	<u>Additional Federally Listed.</u> Species listed under the U.S. Endangered Species Act receive conservation attention wherever they occur.
	Tier V	<u>Additional State Listed.</u> Species on state endangered, threatened, or special concern lists that did not meet any of above criteria. These are often rare or peripheral populations.
North Atlantic Regional Shorebird Plan (2001) ³	5	Regional Priority Level: High
	4	Regional Priority Level: Moderate-High
	3	Regional Priority Level: Moderate
	2	Regional Priority Level: Moderate-Low

Conservation List	Categories	Criteria or Rule
North American Waterbird Conservation Plan (NAWCP; 2002) ⁴	Highly Imperiled	This includes all species with significant population declines and either low populations or some other high risk factor.
	High Concern	Species that are not highly imperiled. Populations of these species are known or thought to be declining, and have some other known or potential threats as well.
	Moderate Concern	Species that are not highly imperiled or high concern. Populations of these species are either a) declining with moderate threats or distributions; b) stable with known or potential threats and moderate to restricted distributions; or c) relatively small with relatively restricted distributions.
	Low Concern	Species that are not highly imperiled, of high concern or moderate concern. Populations of these species are either a) stable with moderate threats and distributions; b) increasing but with known or potential threats and moderate to restricted distributions; or c) of moderate size with known or potential threats and moderate to restricted distributions.
	Not Currently at Risk	All other species for which information was available, that were not highly imperiled or of high, moderate or low concern.
	Information Lacking	If both population trend and population size could not be estimated, species were not ranked.
North American Waterfowl Management Plan (NAWMP): Implementation Framework (2004) ⁵	Highest	Continental Priority – High and Geographic Importance – High
	High	Continental Priority – Moderately High, Moderate, Moderately Low or Above Objective and Geographic Importance – High OR Continental Priority- High and Geographic Importance-Moderately High
	Moderately High	Continental Priority – Moderately High or Moderate and Geographic Importance – Moderately High
	Moderate	Continental Priority – Moderately Low or Above Objective and Geographic Importance – Moderately High OR Continental Priority – High and Geographic Importance – Moderately Low
	Moderately Low	Continental Priority – Moderately High or Moderate and Geographic Importance – Moderately Low
	Low	Continental Priority – Moderately low or Above Objective and Geographic Importance – Moderately Low

¹Virginia Wildlife Action Plan (2005). The Virginia Wildlife Action plan identifies 925 species of greatest conservation need (SGCN) in the commonwealth of Virginia. Within the SGCN list, species are classified into four tiers that were developed to identify the relative importance of conservation need for each species.

²Partners in Flight (PIF): Mid-Atlantic Coastal Plain (Area 44) Bird Conservation Assessment (2004). The goal of the PIF plan is to ensure the long-term maintenance of healthy populations of native birds in the Mid-Atlantic Coastal plain, primarily non-game bird species. The plan ranks bird species in each physiographic area according to their conservation priority.

³North Atlantic Regional Shorebird Plan (2001). The North Atlantic Regional Shorebird Plan steps down the goals of the larger United States Shorebird Conservation Plan to the regional scale. The plan identifies priority species, habitat and species goals, and prioritizes the implementation conservation projects.

⁴ North American Waterbird Conservation Plan (2002). This plan provides a continental framework and guide for conserving waterbirds by setting goals and priorities for waterbirds in all habitats

⁵ North American Waterfowl Management Plan: Implementation Framework (2004). The vision of this plan is to recover waterfowl populations in the western hemisphere. The plan's prioritization of ducks was based on continental population trends and combined continental harvest data. Geese and swans continental prioritization was based on a matrix of population trends and deviations from the 2000–2002 population objectives.

Sources for Table A.3 Conservation List and Agency, Tier Categories, and Definition

- Virginia Department of Game and Inland Fisheries. 2005. Virginia Wildlife Action Plan. <http://bewildvirginia.org/wildlifeplan/>
- Partners in Flight. 1999. Bird Conservation Plan for the Mid-Atlantic Coastal Plain (Physiographic Area 44). http://www.partnersinflight.org/bcps/plan/pl_44_10.pdf
- Northern Atlantic Shorebird Habitat Working Group. 2001. Northern Atlantic Regional Shorebird Plan: Version 1. <http://www.fws.gov/shorebirdplan/RegionalShorebird/downloads/NATLAN4.pdf>
- Waterbird Conservation for the Americas. 2002. Waterbird Conservation for the Americas: The North American Waterbird Conservation Plan, Version 1. <http://www.waterbirdconservation.org/nawcp.html>
- United States Fish and Wildlife Service. 2004. North American Waterfowl Management Plan (NAWMP) Implementation Framework. <http://www.fws.gov/birdhabitat/NAWMP/files/ImplementationFramework.pdf>

Appendix B



Planning team site visit

Findings of Appropriateness and Compatibility Determinations

COMPATIBILITY DETERMINATION

Project Title: Environmental Education, Wildlife Observation, Interpretation and Photography

Station Name: Rappahannock River Valley National Wildlife Refuge

Date Established: May 28, 1996

Establishing Authorities:

The Emergency Wetlands Resources Act of 1986 (100 Stat. 3582-91) for: "...the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions..." (16 U.S.C. §3901(b); 100 Stat. 3583).

The Endangered Species Act of 1973 (16 U.S.C. §1531-1543), as amended: "...to conserve (A) fish or wildlife which are listed as endangered species or threatened species...or (B) plants..." (16 U.S.C. §1534).

The Land and Water Conservation Fund Act (P.L. 88-578; 16 U.S.C. §4601; 78 Stat. 897) for: "...the acquisition of areas needed for conserving endangered or threatened species of fish, wildlife and plants..." (P.L. 94-422; 90 Stat. 1313).

Purpose for which Established:

The purposes for which the Rappahannock River Valley National Wildlife Refuge was established are:

"...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds ... 16 U.S.C. § 715d (Migratory Bird Conservation Act)," and

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species or (B) plants ... 16 U.S.C. § 1534 (Endangered Species Act of 1973)," and

"... the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ... 16 U.S.C. § 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act of 1986)," and

"...for the development, advancement, management, conservation, and protection of fish and wildlife resources ... 16 U.S.C. § 742f(a)(4) (Fish and Wildlife Act of 1956)."

National Wildlife Refuge System Mission: To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Proposed Use: The following questions and answers provide a concise description of the proposed use.

1. What is the use? Is the use a priority public use? The uses are environmental education, wildlife observation, interpretation, and photography, all of which are priority public uses of the Refuge System.

2. Where would the use be conducted? We would allow these uses on the Hutchinson Tract, the Laurel Grove Tract, the Port Royal Unit, the Tayloe Tract, the Wellford Fee Tract and the Wilna Tract. The Wilna Tract is also the site of the Refuge headquarters. We may also allow these uses on other tracts on a case-by-case basis. If they are allowed on other tracts, special use permits would be issued to ensure that the activities follow the stipulations and general compatibility standards set forth in this determination. See attached maps B.1 – B.7.

General description of the affected areas:

Hutchinson Tract

The Hutchinson Tract is 727.35 acres located along Mt. Landing Creek in Essex County. It has nearly 3,000 feet of frontage along U.S. Route 17, making it an ideal location to attract and welcome visitors. Habitats include 197 acres of planted warm season grasses, 145 acres of planted hardwoods, 240 acres of mixed upland and wet forest types, 134 acres of tidal marsh and open water, and 11 acres of roads and administrative areas. Gravel and dirt roads bisect the tract, one of which extends from Route 17 to Mt. Landing Road (State Route 627). Another road ends at an existing boat dock and pier on Mt. Landing Creek.

Wildlife observation and photography would occur primarily along 2.2 miles of existing refuge roads and along approximately 2.7 miles of trails paralleling the road and along the interface of woods and fields. Interpretive kiosks would be placed at strategic points such as the entrance area and at the old pier site on Mt. Landing Creek. We would facilitate additional interpretation and wildlife observation by replacing the existing pier and boat dock with a floating canoe/kayak launch and developing an interpretive water trail along Mt. Landing Creek. Environmental education would occur at various places on the property, depending on the educational activity. We would use a covered pavilion near the entrance to stage field trips, and some educational activities could also occur in the upland fields at this location. We would create up to three parking areas, and provide up to two restrooms, to facilitate these priority uses. A proposed site plan for visitor facilities is attached.

We manage this property primarily for breeding, migrating and wintering birds. Most of our active management (mowing, prescribed burning, invasive species control) is directed toward maintaining approximately 200 acres of grassland habitat. We also monitor and control invasive populations of phragmites in the tidal marshes to maintain the high quality of that habitat for waterfowl, marsh birds, and wading birds.

Laurel Grove Tract

The Laurel Grove Tract is 463 acres located in southern Richmond County. It contains approximately 0.8 miles along Farnham Creek. In 2003, we worked with partners to restore 205 acres from cropland to forest by planting over 60,000 hardwood saplings. Within that area, hydrology was restored on 50 acres by ditch plugging and breaking drainage tiles. The remainder of the tract consists of mixed hardwood and pine forest encompassing 240 acres, seven acres of tidal marsh, a 10-acre man-made, freshwater pond, and one acre of developed administrative land. The tract is bisected by a dirt road.

Nearly all activities would occur in the vicinity of the 10-acre pond. We would create a small (no more than 10 vehicles) parking lot to facilitate priority uses, which would be located on the site where three grain silos now stand. The silos have been declared excess property and will be removed. From there, a wildlife observation trail would cross the dam that holds back the pond, and circumvent the pond back to the parking lot, using Farnham Road for the last leg of the trail. Farnham Road is a two-lane country road that ends at Farnham Creek, adjacent to the Laurel Grove Tract, and traffic is sparse. An interpretive kiosk would be installed adjacent to the parking lot. Environmental education field trips and other special events may be allowed into the interior of the tract, along the existing dirt road, with advance planning and approval.

Management at Laurel Grove is primarily aimed at reducing occurrences of invasive plants. Planted trees are currently providing early successional shrub habitat for nesting, migrating and wintering birds, while mature woodlands are providing habitat needs for a variety of wildlife including forest birds, reptiles and amphibians.

Port Royal Unit

The Port Royal Unit is comprised of two adjacent tracts totaling 123 acres in Caroline County. This unit is located near the intersection of U.S. Route 17 and U.S. Route 301, offering opportunities to attract travelers who choose alternative routes to the interstate highway system. It is also currently the closest refuge property to major population centers such as Washington, D.C. and Northern Virginia. Combined, the two tracts contain 71 acres of early successional and grassland habitat, 45 acres of forested habitat, and 7 acres of freshwater tidal marsh and open tidal water. There are two access points from paved county roads.

We would permit wildlife observation and photography from trails extending from the entrance area, along the edge of a field, along the Rappahannock River and along the woods edge bordering the tidal marsh. We would create a small (less than 10 vehicles) parking lot to facilitate priority uses. We would install an interpretive kiosk near the parking lot. We would install a photo blind adjacent to the tidal marsh. Environmental education field trips would be permitted throughout the property with advance planning and approval.

With regard to habitat management, there are several invasive plant species that occur on the unit and that we are actively seeking to eliminate or control: autumn olive, tree of heaven, and Johnson grass. We are managing approximately 50 acres in grassland and allowing 21 acres of former cropland to grow into forest along the River. Bald eagles have nested on the property, requiring that any recreational use or construction be done in accordance with management guidelines for bald eagles. Many other bird species use the property for nesting, during

migration, and during winter. There is an abundance of reptiles, particularly turtles, in and around the tidal marsh and creek.

Tayloe Tract

The Tayloe Tract was the first property protected as part of the refuge, having been acquired in May 1996. It is also one of the largest refuge properties at 1,112 acres. It is located in Richmond County, and has approximately six miles of frontage on Cat Point Creek, one of the refuge's highest priority areas for land protection. Habitats break down as follows: 355 acres of wooded swamp and upland forest, 277 acres of freshwater tidal marsh and open tidal water, 225 acres of grassland and early successional habitat, 217 acres of agricultural land, 30 acres of wet meadow, and eight acres of roads and other administrative lands. Approximately 2.5 miles of gravel and dirt roads provide access within the tract, which also has over one mile of frontage on State Route 634. A modular building constructed in 2007 is used for staff quarters.

Wildlife observation and photography would occur primarily from the existing dirt and gravel roads. A small parking area (10-15 vehicles) would be constructed near the entrance from Route 634, and from there access would be by foot, unless advance approval was obtained, such as for environmental education field trips and guided bird walks. Environmental education would be permitted throughout the property if scheduled and approved in advance. The Tayloe Tract provides an excellent opportunity to interpret the evolution of wildlife management, from historic methodologies such as planting food plots for wildlife, to more current techniques such as restoring lands to historic habitat conditions. This could be accomplished with messages on kiosks, a brochure, and through guided talks.

There is a great deal of active management occurring on the Tayloe Tract, including planting and management of warm season grasslands, reforestation, cropland management (for an interim period as restoration plans are completed), and invasive species control. In addition to providing year-round habitat for a variety of migratory birds and resident wildlife, these management activities also lend themselves to conveying important interpretive messages. Bald eagles use the shoreline of Cat Point Creek extensively for nesting and roosting, so bald eagle management guidelines must be followed for all public use and other management actions.

Wellford Fee Tract

This tract is one of three purchased from the same family, the other two being conservation easements. Tract 37 was purchased in fee title and consists of 154.2 acres, with approximately one mile of frontage on Little Carter Creek. It contains 40 acres of wooded swamp and forest, 12 acres of wet meadow, six acres of freshwater tidal marsh and open water, three acres of gravel road and other administrative areas, and 93 acres of early successional habitat, about 60 acres of which was planted to native hardwoods and shrubs in 2007. There is an office trailer on the property occupied by staff of the Department of Game and Inland Fisheries through a Memorandum of Agreement. There is also a one-acre private inholding in the center of the property. The property is accessible from U.S. Route 360, with nearly one-half mile of frontage on this four-lane divided highway.

We would allow wildlife observation, interpretation and photography from the entrance at Route 360 and parallel to Route 360 to a turn-around at Little Carter Creek. We would install an

interpretive kiosk and wildlife viewing platform at the turn-around. We would construct a one-lane gravel road for access, with pull-off areas for vehicle passing. We would also install a bronze memorial plaque that we purchased to pay tribute to the now deceased landowner who conveyed the property to the refuge. We would also install a sign reading: “Forests for the Future” along Route 360 to inform passersby of the partnership project.

Management of this tract is directed toward complete reforestation, with the exception of administrative areas. We also are monitoring and treating invasive species as time and funding permit. Partners are assisting in monitoring the success of the tree planting effort.

Wilna Tract

The Wilna Tract is approximately 974 acres, and as noted above, is the current location of the refuge headquarters. The Wilna House headquarters dates from the 1830s, offering opportunities for historic as well as environmental interpretation. A new, modular building was constructed near Wilna Pond in 2007 to serve as an environmental education classroom, meeting room, and temporary quarters. There are a variety of habitats including 507 acres of wooded swamp and upland forest, 388 acres of grassland and other early successional habitats, 52 acres of freshwater tidal marsh and open water, nine acres of wet meadow, 2 acres of beachfront on the Rappahannock River, and 16 acres of roads and other administrative areas. Included in the open water category is the 35-acre Wilna Pond, a freshwater impoundment. The Wilna Tract has nearly one mile of frontage on the Rappahannock River and is accessible from State Route 640 (Sandy Lane).

Wildlife observation and photography would occur along existing refuge roads and from existing trails in the vicinity of Wilna Pond and behind the headquarters building. Environmental education opportunities will be centered in the Wilna Pond area, but may be permitted throughout the unit, if planned and scheduled in advance. Interpretive messages will be displayed on kiosks and inside buildings. Photography would occur mostly in the vicinity of Wilna Pond, and a photo blind is planned for construction overlooking a beaver pond along Wilna Creek.

As with the Tayloe Tract, there is a great deal of habitat management occurring on the Wilna Tract, including burning and mowing of warm season grasslands, invasive species control, riparian restoration and management, and erosion control (planned). A wide variety of birds use grasslands, shrub lands, and forests year round, as do many resident wildlife species. Bald eagles use the Wilna Tract extensively and bald eagle guidelines will be followed.

3. When would the use be conducted? Eventually, we plan to allow public access for these priority uses daily, from sunrise to sunset. The process will be gradual as we install appropriate signs, gates, and other measures to control access and ensure safety, quality, and compatibility. We expect most environmental education field trips will be coordinated and scheduled in advance. If law enforcement problems arise, we may limit hours or otherwise restrict access.

Hunting is permitted on several refuge tracts, including most of those tracts listed above. During the hunting season, we will either close areas to activities other than hunting or segregate users to ensure public safety.

4. How would the use be conducted? We plan to offer structured, teacher-led environmental education on a pre-scheduled basis. We would conduct teacher workshops to familiarize teachers with wildlife and nature-based curricula and refuge facilities, and would expect teachers to direct their students in structured activities in the many available habitats. The Wilna Pond site will be our preferred environmental education location due to the facilities currently available and the proximity to the headquarters. We have a pier and modular building that will serve as a sampling platform and indoor classroom, respectively. Habitats available for sampling and study include the pond itself, freshwater marsh, forest, and grassland. We would provide equipment, as funding allows, and an orientation on the day of the field trips.

Other uses would be self-guided, except for the occasional guided bird walk or similar special activity. We will comply with accessibility standards in trail and other facility construction. We will utilize existing roads and trails wherever possible to minimize loss of existing habitats. Interpretive signs along the trails and overlooks will provide messages for visitors that complement the habitat types and wildlife found in each area. We plan to construct at least two photo blinds to facilitate a high quality experience.

5. Why is the use being proposed? These uses are being proposed by the refuge to accommodate four of the priority public uses of the Refuge System. There is a scarcity of public lands in the Northern Neck and Middle Peninsula of Virginia for wildlife-oriented recreation, particularly for environmental education. There are few areas on the Northern Neck or Middle Peninsula Planning Districts that provide opportunities for “nature study,” as defined in the 2002 Virginia Outdoors Plan. We have the opportunity to provide compatible, priority public uses in a manner and location that will offer high quality wildlife-dependent recreation, and maintain the level of current fish and wildlife values.

Availability of Resources: Facilities or materials needed to support these uses include upgrading and maintaining access roads, creating and maintaining parking areas, constructing and maintaining restrooms, producing brochures and maintaining our web site to explain refuge regulations and describe permitted activities, creating and maintaining accessible trails, constructing a non-motorized boat launch, fishing pier, and pavilion at the Hutchinson tract, purchasing and installing kiosks, designing and producing panels to provide interpretive messages, and constructing photo blinds.

Funding for visitor improvements comes from a variety of sources including general management capability funds, challenge cost share projects, grant funds, contributions, and special project funds. We will complete and maintain projects and facilities as funds become available and will use volunteers and partners to help in construction and maintenance.

Over the past five years, approximately \$275,000 has been allocated from special project funds to create infrastructure at the Wilna Pond site. We have \$1 million available from Federal Highway Administration funding to upgrade refuge roads in 2008. In 2007, \$310,000 was allocated for visitor enhancements at the Hutchinson Tract. An additional \$10,000 for portions of the Hutchinson Tract projects was received from donations and a Chesapeake Gateways grant. Sufficient staff and maintenance funding within our base budget of nearly \$850,000 is available to make annual progress toward completion of all the projects described above and to maintain those already completed.

Anticipated Impacts on Refuge Purpose: The activities proposed herein are supported by the goals and objectives of the refuge's Draft Comprehensive Conservation Plan. Providing compatible wildlife-dependent recreation and education is common to all alternatives listed in the CCP. The Service's preferred alternative lists the following goal related to visitor use of the refuge:

Goal 4: Promote enjoyment and stewardship of our Nation's natural resources by providing quality, wildlife-dependent recreation and education opportunities on refuge lands and waters.

Under Alternative B, Goal 4, there are three objectives that relate to topics covered in this determination:

Objective 4.5 Wildlife Observation and Photography,
Objective 4.6 Environmental Education, and
Objective 4.7 On-site Interpretation

As noted on page one of this compatibility determination, there are four purposes for establishment and management of this refuge. In general, they relate to four primary conservation and management responsibilities:

1. Migratory birds,
2. Threatened and endangered plant and animal species,
3. Wetlands, and
4. Other fish and wildlife resources.

Following is a discussion on the anticipated impacts of the proposed uses related to the resources listed within refuge purposes.

Potential impacts to birds: An indirect benefit to upland habitats and associated species would derive from careful, strategic placement of trails and interpretive signs. Public awareness and appreciation of the refuge, its habitats, and resources would inspire some to volunteer or in other ways support the refuge needs and conservation of resources on the landscape in general.

Increases in annual visitor numbers from constructing new trails along the edges of fields and forests at Hutchinson, a public canoe/kayak launch at Hutchinson, improvements to the existing public recreation area at Wilna, and other planned activities described herein have the potential to cause loss of land bird habitat and disturbance to nesting, migrating, and wintering birds. However, the potential impacts vary due to each tract's respective habitat management scenario and the types of visitor use. Direct impacts on wildlife in the form of disturbance can be expected wherever humans have access to an area, and the degree may vary depending on the habitat type. In general, human presence disturbs most wildlife, which typically results in a temporary displacement without long-term effects on individuals or populations. Some species, such as wood thrush, will avoid areas frequented by people, such as developed trails and buildings, while other species, particularly highly social species such as eastern tufted titmouse, Carolina chickadee, or Carolina wren, seem unaffected or even drawn to a human presence.

When visitors approach too closely to nests, they may cause the adult bird to flush exposing the eggs to weather events or predators. Provided that visitor use is confined to trails, disturbance during the breeding season will be limited to the trail area. The extent of this disturbance on either side of the trail also depends on visibility, the density of vegetation through which the trail is laid. Overall, direct impacts from non-consumptive uses should be greatly reduced if trails and other high-use facilities avoid area-sensitive habitats (interiors of grasslands and forests) and are confined to a 300-foot edge zone, which is what we plan to implement.

Potential impacts to threatened and endangered species: We included bald eagles in this section due to the fact that they were a focal species during refuge establishment and because of the extra protection they are afforded under the Bald and Golden Eagle Protection Act. The only federal-threatened species confirmed to exist on the refuge is the sensitive joint-vetch.

Permitting public access to any waterfront or marsh managed by the refuge holds the possibility of impacting bald eagles or sensitive joint vetch. Impacts may either be displacement or temporary disturbance depending on the extent of use of a given site by visitors and eagles. We plan to provide public facilities to facilitate wildlife observation, photography, and interpretation on Mt. Landing Creek, Wilna Pond, and Laurel Grove Pond. We will also provide public access to the banks of the Rappahannock River, Roy's Run, Farnham Creek, Cat Point Creek, and Little Carter Creek. All of these water bodies are used by bald eagles, some in high concentrations and for nesting. As trees mature and forest riparian buffers are improved, sites with low concentrations will likely increase in importance to bald eagles.

We will avoid potential adverse impacts to bald eagles by strictly following the management guidelines developed in consultation with the DGIF and the Center for Conservation Biology. These include sight and distance setbacks from nests and concentration areas and time-of-year restrictions.

None of these plans will impact known locations of sensitive joint vetch.

Potential impacts to wetlands: Potential adverse impacts to wetlands could arise if facilities were improperly placed in wetland habitats, if public use were allowed to occur directly in wetlands, or if erosion of sediments into wetlands was allowed to occur during facility construction.

The only facilities proposed for construction in wetlands are the pier and canoe/kayak launch and the proposed elevated boardwalk at the Hutchinson Tract. Together, construction of these facilities will cause temporary and minimal (less than 0.01 acre) impacts to wetlands. We will employ silt fencing and other best management practices during construction of any facilities in proximity of wetlands to avoid runoff of sediments.

Many of our interpretive messages remind visitors of the importance of wetlands and the many beneficial functions they provide to society, including wildlife habitat, flood protection, groundwater recharge and nutrient uptake.

Potential impacts to other fish and wildlife: Mammals in Virginia occupy a diverse array of habitat types, ecological niches and food webs and play an important role in the ecosystems in

the refuge boundary. As a taxonomic group, mammals will also benefit from the refuge land protection and management actions relative to riparian habitats, forests, grasslands, shrub, and wetlands proposed for listed species, waterfowl, and migratory birds. Likewise, the refuge will benefit from careful attention to the impacts to mammals resulting from any of its activities. We evaluated the management actions and public uses proposed for each of the refuge CCP alternatives for their potential to benefit or adversely affect large and small, aerial, terrestrial, and wetland mammals. The activities described in this determination should have no long-term impact on mammal use of the refuge.

Protection and good stewardship of the area's herpetofauna is another priority of the refuge, and fits into nearly all the goals for wetlands, uplands, and riparian habitats. We evaluated the public uses described herein for their potential to benefit or adversely affect amphibians and reptiles or their habitats used for mating, reproduction, over-wintering, and foraging. Although most species that occur on the refuge are very common and widespread, there is concern for two species of turtle: eastern box and spotted, and amphibians everywhere are considered to be experiencing a general decline. Some areas are experiencing loss of mixed mature forest due to development or high rates of conversion to timber farms. This impacts vernal pools needed by amphibians for over-wintering and reproduction. No vernal pools will be impacted by these proposed activities. Public outreach and education efforts by the refuge that emphasize buffering of wetlands, connectivity and easy access between forest, grassland, and wetlands, protection of vernal pools, and augmentation of patch size will benefit amphibians and reptiles on an even larger scale where embraced by other landowners.

Sometimes maintenance actions for public use may involve preparations or outcomes that have direct negative impacts to amphibians and reptiles. Mowing of grassy access roads and public use trails occasionally destroys turtles, snakes or frogs if conducted during times of movement (warm months). The best way to minimize this direct type of negative impact is to keep public use and access roads mowed short so that they do not become attractive habitat. However, in many cases it will be impossible to find a perfect time to carry out maintenance actions that will completely avoid conflict for wildlife.

Opening a limited amount of habitat for the public to experience and appreciate through a network of interpretive trail systems and outdoor classroom sites should heighten an awareness of the habitat needs and plight of declining reptiles and amphibians in the minds of children and adults. There is limited opportunity in the refuge boundary area for adults to be exposed to the more reticent, uncommon, or interior species of reptiles and amphibians in natural habitats. Adults are homeowners, landowners, land managers, and land-use decision makers, and they have considerable influence on the value systems of children. Opportunities to learn and marvel about the habits, appearance, and needs of reptiles and amphibians and their role in the ecosystem will indirectly benefit this group of animals if these learning experiences translate into beneficial changes in landscaping, yard maintenance, farming practices, pesticide use, and management of towns and communities.

Enhancement and expansion of the trail systems for public use poses the potential threat of blocking access between different habitat types, depending on the placement, length, width, and substrate material of the trails. Some salamander species will not cross openings that are too wide or dry, bare ground (Vinson 1998), thus earthen trails, if exposed to sunlight could become dry enough to form a barrier. Gravel roads or trails, even though thought to be permeable, may

also act as a barrier to salamander movement (Marsh et al. 2005). The graveled trails planned for the near future are for wheelchair access and will therefore be located on level terrain, avoiding ravines which are home to amphibians and reptiles. At most these trails will be five miles in length on four tracts, and their widths no more than six feet. Other walking trails will be simple cleared paths and perhaps mulched in some locations, but these too will avoid moist ravines close to amphibian habitat.

Disturbance to basking or nesting turtles may occur where public use is concentrated at points where land and water interface. Basking turtles can usually find alternate resting surfaces. Nesting turtles, once engaged in the act of digging usually will not allow their attention to be drawn to anything else, and at such time are vulnerable to predators. A turtle wishing to make landfall to attempt egg-laying however, may be dissuaded by the presence of humans at the site. Because there will be ample wetland-forest-grassland interface elsewhere, we expect that the cumulative impact of roads and trails to amphibians and reptiles at the landscape scale will be insignificant.

Expansion of facilities such as the Wilna Lodge may result in adverse impacts to nocturnal amphibians where motion-detection security lamps are installed. Artificial illumination may have both positive and negative impacts on the nocturnal behavior and ecology of frogs (Buchanan 2002) and salamanders (Wise and Buchanan 2002). While it may enhance prey detection it may also hurt predator avoidance, cause aggression between individuals of the same species, cause temporary blindness in frogs (sudden bright light), disrupt or confuse migration to or from ponds for salamanders (Wise and Buchanan) or inhibit reproduction by frogs adapted to low illumination (Buchanan).

In summary, our research, observations and knowledge of the area provide no evidence that cumulatively, the visitor activities we propose to allow will have an unacceptable effect on wildlife resources or their habitats. We do not expect a substantial increase in the cumulative effects of visitor use over the 15 year timeframe of this plan. Refuge staff will monitor and evaluate the effects of visitor use, in collaboration with state agencies and partners, to discern and respond to unacceptable impacts on wildlife or habitats.

Public Review and Comment: This determination was made available for a 30-day public review and comment period in conjunction with the release of the Draft Comprehensive Conservation Plan for the refuge.

Determination (check one below):

Use is Not Compatible

 X

Use is Compatible With the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

1. All activities will comply with the Bald Eagle Protection Guidelines for Virginia, jointly developed by the U.S. Fish and Wildlife Service and the Virginia Department of Game and Inland Fisheries, in consultation with the Center for Conservation Biology.
2. Uses will be monitored as needed to ensure that the programs contribute to refuge objectives.
3. Migratory bird populations will be monitored through annual breeding and wintering surveys, as funds allow, to ensure the continued health and vitality of these species.

Justification: Environmental education, wildlife observation, interpretation, and photography are four of the six priority public uses of the National Wildlife Refuge System and have been determined to be compatible activities on hundreds of other refuges nationwide. The Refuge System Improvement Act of 1997 instructs refuge managers to seek ways to accommodate these six activities. The refuge properties described in this determination offer a wide variety of habitats and compatible wildlife-dependent recreational and educational opportunities. They provide a wealth of avifauna and other “watchable wildlife,” that can be enjoyed by the public without causing negative impacts to the diversity or productivity to fish, wildlife or plants that now use it. Impacts from this proposal, both short-term and long-term, direct, indirect, and cumulative, are expected to be minor and are not expected to diminish the value of the refuge for its stated objectives. The area affected by the proposed use represents a small fraction of the refuge land area. Available parking and size of the facilities will typically limit use at any given time, except during special events. Monitoring bird use will provide a basis for future recommendations to ensure the continued productivity of refuge habitats.

In accordance with 50 CFR 26.41, opening the Rappahannock River Valley National Wildlife Refuge to environmental education, wildlife observation, interpretation, and photography, as described herein, will not materially interfere with, or detract from, the fulfillment of the National Wildlife Refuge System mission or the purposes for which the refuge was established.

Signature: Refuge Manager: Joseph F. McCouley 12/14/09
(Signature and Date)

Concurrence: Regional Chief: Anthony D. Legé 12/21/2009
(Signature and Date)

Mandatory 15-year Re-evaluation Date: December 21, 2024

References:

Buchanan, B.W. 2002. Observed and potential effects of artificial light on the behavior, ecology, and evolution of nocturnal frogs. *In* Proceedings of the Urban Wildlands Group, Ecological consequences of artificial night lighting, February 23-24, 2002. Los Angeles, CA. Catherine Rich & Travis Longcore, Conference Co-Chairs.

Commonwealth of Virginia, Department of Conservation and Recreation, Division of Planning and Recreation Resources. 2002. *Virginia Outdoors Plan*. 445pp.

Marsh, D.M., G.S. Milam, Gorham, N.P. N.G. Beckman. 2005. Forest roads as partial barriers to terrestrial salamander movement. *Conservation Biology*. 19:6, 2004-2008.

Vinson, M. 1998. Effects of recreational activities on declining anuran species in the John Muir Wilderness, CA. Missoula, MT: University of Montana. 83 p. Thesis.

Wise, S. and B.W. Buchanan. 2002. The influence of artificial illumination on the noc Impact of artificial lighting on moths. *In* Proceedings of the Urban Wildlands Group, Ecological consequences of artificial night lighting, February 23-24, 2002. Los Angeles, CA. Catherine Rich & Travis Longcore, Conference Co-Chairs.

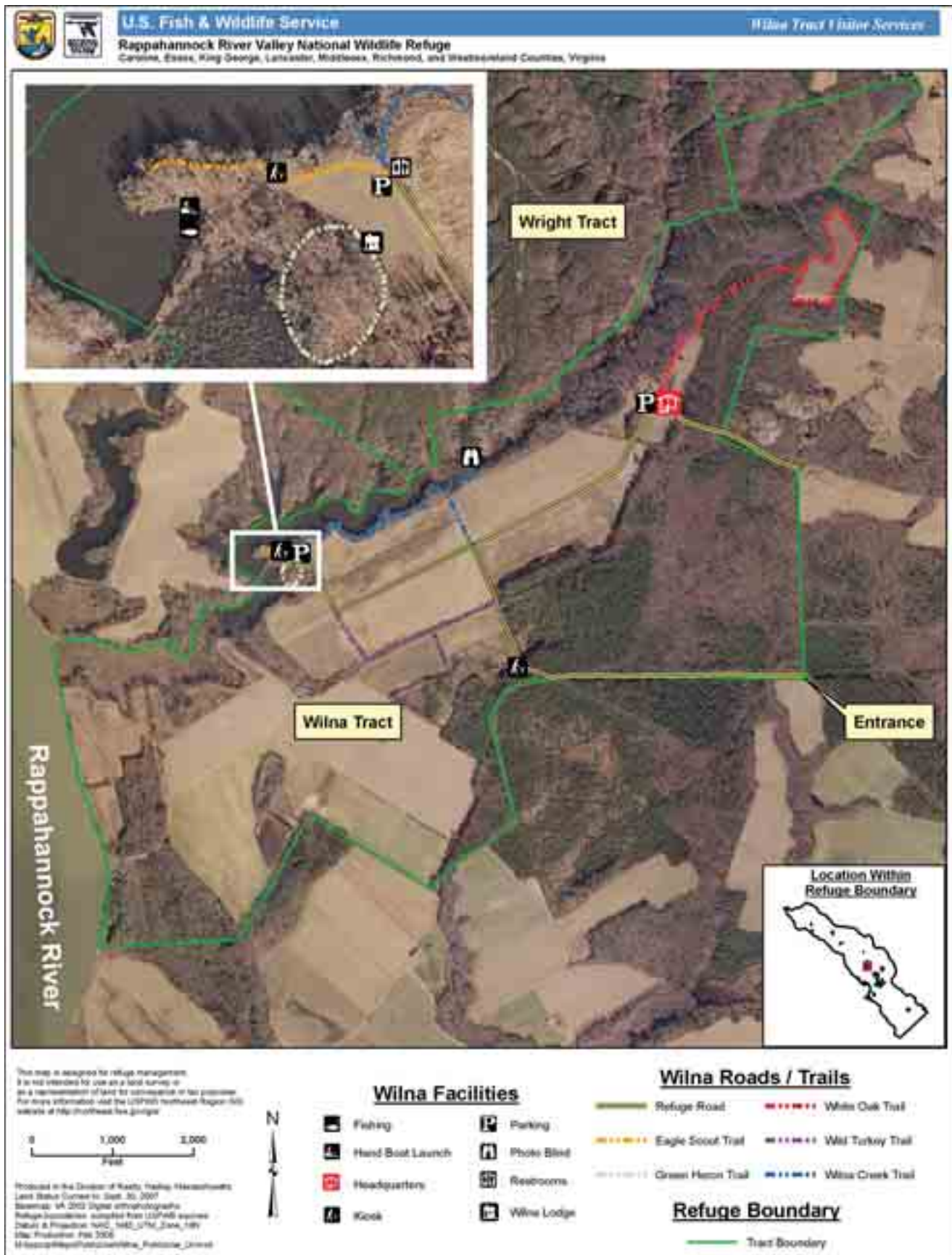
Map B.1. Rappahannock River Valley National Wildlife Refuge and its Regional Setting



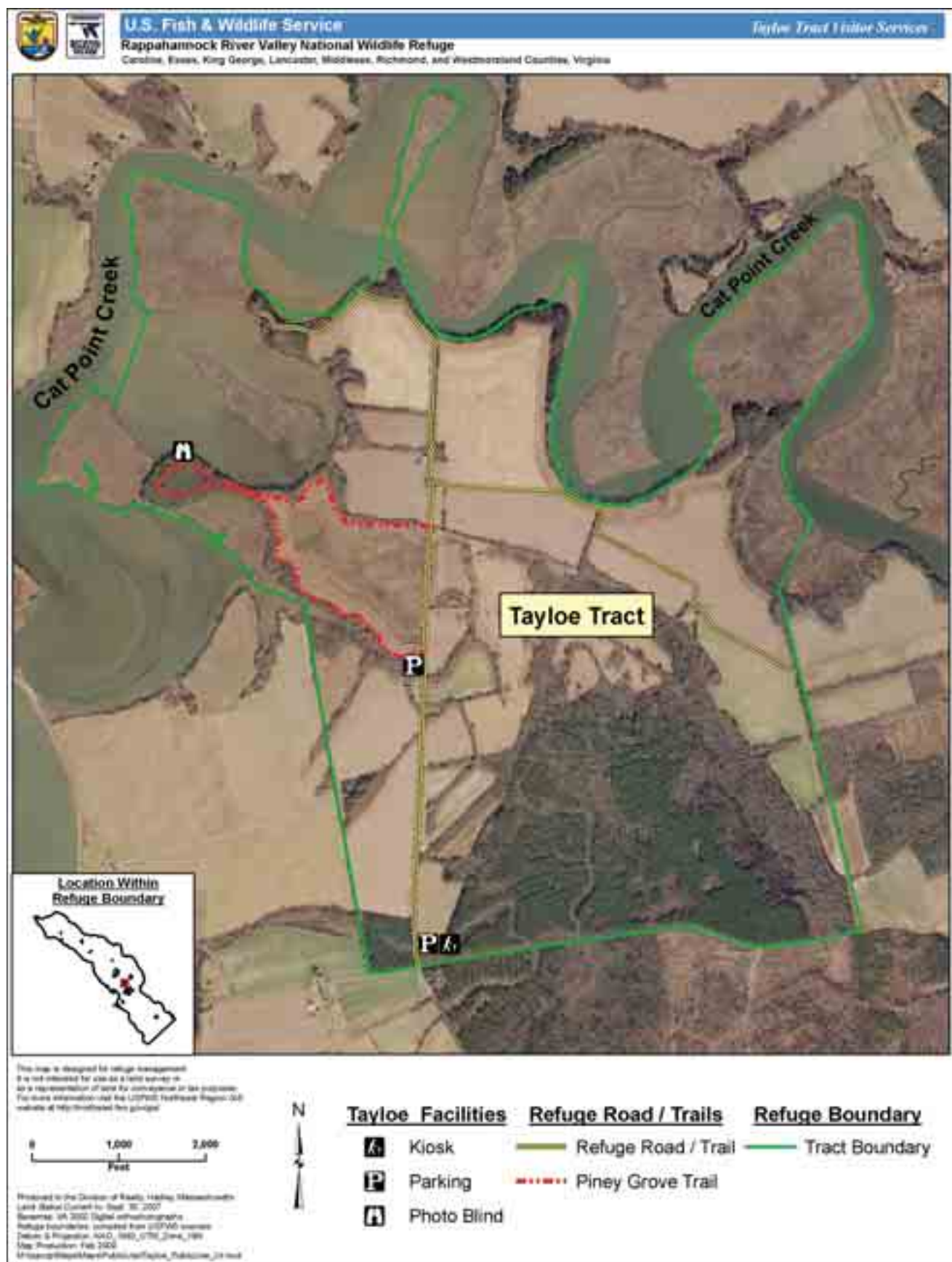
Map B.2. Public Use on Port Royal Unit (Burns and Long Tracts)



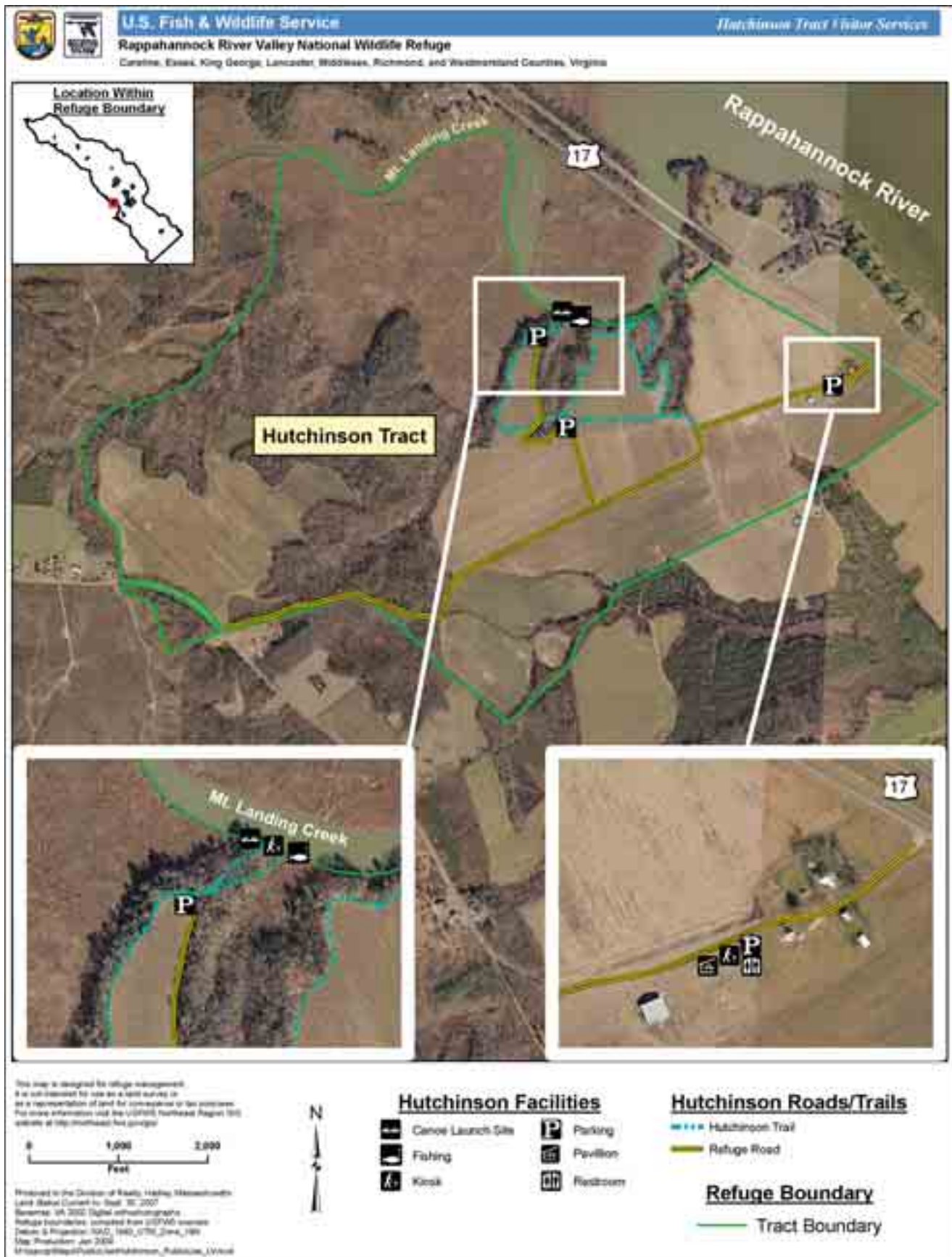
Map B.3. Public Use on the Wilna Tract



Map B.4. Public Use on the Tayloe Tract



Map B.5. Public Use on the Hutchinson Tract



Map B.6. Public Use on the Laurel Grove Tract



Map B.7. Public Use on the Wellford Tract



COMPATIBILITY DETERMINATION

Project Title: Public Deer Hunting

Station Name: Rappahannock River Valley National Wildlife Refuge

Date Established: May 28, 1996

Establishing Authorities:

The Emergency Wetlands Resources Act of 1986 (100 Stat. 3582-91) for: "...the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions..." (16 U.S.C. §3901(b); 100 Stat. 3583).

The Endangered Species Act of 1973 (16 U.S.C. §1531-1543), as amended: "...to conserve (A) fish or wildlife which are listed as endangered species or threatened species...or (B) plants..." (16 U.S.C. §1534).

The Land and Water Conservation Fund Act (P.L. 88-578; 16 U.S.C. §4601; 78 Stat. 897) for: "...the acquisition of areas needed for conserving endangered or threatened species of fish, wildlife and plants..." (P.L. 94-422; 90 Stat. 1313).

Purpose for which Established:

The purposes for which the Rappahannock River Valley National Wildlife Refuge was established are:

"...for the development, advancement, management, conservation, and protection of fish and wildlife resources...16 U.S.C. 742f(a)(4)... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude... 16 U.S. C. 742f(b)(1) (Fish and Wildlife Act of 1956);

...for the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ... 16 U.S.C. 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act of 1986); and

...to conserve (A) fish or wildlife which are listed as endangered or threatened species ... or (B) plants ... 16 U.S.C. 1534 (Endangered Species Act of 1973".

National Wildlife Refuge System Mission: To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Proposed Use: We propose to open the Refuge to public deer hunting within the hunting framework established by the Commonwealth of Virginia. All current and future Refuge properties may be opened if the conditions of the hunt conform to the stipulations of this determination. Hunting is one of the six priority public uses of the National Wildlife Refuge System.

We are proposing a deer hunting program for two primary reasons:

- 1) To maintain the deer population at a level commensurate with available habitat, in order to maintain the health of the herd and prevent habitat degradation that accompanies an overpopulation of deer, and
- 2) To provide high-quality wildlife-dependent recreational opportunities, in accordance with the National Wildlife Refuge System Administration Act.

As of December 31, 2001, the Refuge consists of 4,842 acres in 11 tracts, spread over five counties. Habitats include forested riparian zones, fresh and brackish water tidal marsh, upland and bottomland hardwood forest, regenerating pine and mixed hardwood forest, managed grasslands, reverting scrub/shrub fields, and agricultural lands.

Riparian areas are important to roosting and nesting bald eagles. In 2000-2001, 80 active bald eagle nests were observed along the lower Rappahannock River. Eagle concentration areas are located along the River shoreline for approximately 25 miles within the Refuge boundary. The River, adjoining wetlands, and agricultural fields are used by an average of 20,000 ducks, 30,000 geese and 1,000 swans during winter and migration. Over 240 species of birds have been recorded in the Refuge vicinity. The most important wildlife resources found on the Refuge and vicinity during the deer hunting season are bald eagles and migrating and wintering birds.

Hunting could potentially occur from the first week in October to the first week in January. Hunting hours are one-half hour before sunrise to one-half hour after sunset, Monday through Saturday. Sunday hunting is prohibited by State law. Archery season typically extends from the first week in October through the third week in November. Muzzleloading season typically occurs during the second two weeks in November. Firearms season typically extends from the third week in November through the first week in January. The Refuge hunting program may allow hunting during each of these seasons. County firearms regulations prohibit the use of rifles for deer hunting; during the firearms season, only shotguns would be permitted. The Refuge will develop regulations regarding season dates, methods of take, bag limits, open and closed areas, and other program details on an annual basis. These will be included as permit conditions required of each Refuge hunter.

The number of hunters will be determined by the number of acres opened during a given year. A ratio of one hunter, per 25 acres of habitat suitable for hunting, will promote hunter safety and a quality hunting experience. Areas not expected to harbor deer or provide safe hunting opportunities (e.g. tidal marsh and open land) will be excluded from this calculation.

Facilities needed to support hunting will be minimal. We will identify or create several small parking areas, each capable of holding two to ten vehicles. Some of these areas will simply be fields that may be mowed or posted to designate parking areas. Existing roads and pull off areas will be used to the maximum extent possible to avoid any additional loss of habitat. Parking areas will not be located in or near sensitive habitats, such as eagle roosting areas. We will post all Refuge tracts open for hunting, as well as any safety zones or other closed areas.

Availability of Resources: As noted above, development of facilities to support hunting will be minimal. Most of the costs associated with the hunting program will be salary of permanent full time staff. Currently, the staff includes no law enforcement personnel. We will ensure compliance of Federal and State regulations in cooperation with Service special agents, Refuge law enforcement staff brought in on intermittent details, and State game wardens. Some per diem costs, estimated at \$320/year will be incurred when employing staff from other refuges.

An analysis of costs associated with the hunting program, included as part of the Deer Hunting Management Plan, is summarized below:

Pre-hunt preparation staff salary:	\$3,065 (includes processing applications, conducting stakeholder meetings, parking lot construction, posting, and annual hunt program preparation);
Conducting the hunt staff salary:	\$1,612 (includes staffing check station, checking parking areas, opening/closing gates, law enforcement);
Supplies and materials:	\$1,800 (includes signs, posts, postage, copying, envelopes, and check station supplies)
Total:	\$6,477

We plan to charge a \$10.00 permit fee for those selected to hunt. We will request to be included in the recreational fee demonstration program, whereby we will receive 80% of our fee receipts to put back into hunting and other public use programs. Cost estimates are based on 400 applicants and 332 selected hunters for the initial opening (83 hunters per day for four days). Sufficient financial resources exist within the annual Refuge budget to administer this program without significantly impacting other wildlife management responsibilities.

Anticipated Impacts on Refuge Purpose: We assessed the impacts of a hunting program in a Draft Environmental Assessment prepared in December 2001. Impacts discussed in the EA are as follows:

Based on a nationwide survey of all states (Krausman 1992), deer were effectively controlled with hunting and habitat manipulation in many areas where they were overpopulated. The remaining overpopulated herds were either not hunted, had an inadequate doe harvest, or an inadequate general harvest. Because the population of deer in the Refuge boundary area is open, with numerous tracts and corridors for movement and contact with other herds, it is unlikely that hunting will reduce the population to such low levels as to place it at risk of becoming genetically bottlenecked. Also, no prevention or control of epizootic hemorrhagic disease exists to date except by keeping populations below the carrying capacity of their habitats. In a 10-year study in northwestern Pennsylvania examining the impacts of varying densities of deer on deer health and habitat, starvation mortality resulted when densities reached higher than 25 deer per square kilometer (247 acres). Species richness and abundance of shrubs and herbaceous vegetation was also shown to decline when deer densities reach between 4-8 deer/km² (deCalesta and Stout 1997). At high densities, deer may act as a host reservoir for Lyme-disease bearing ticks (Jones et al. 1998). Reducing the deer population will reduce the potential for Lyme disease transmission. Based on these considerations, it is anticipated that hunting would have a positive impact on deer health and quality and habitat condition. Reducing the deer population will also benefit the surrounding human community by reducing damage on crops and residential landscape vegetation.

No adverse impacts to vegetation from trampling from hunters is likely, as most species will have already undergone senescence or become dormant. Soil and water quality are not expected to experience any negative effects under this alternative. The deer hunt would occur outside of the breeding period of most species, thereby avoiding any potential disturbance. The Refuge will abide by the joint Service-State Bald Eagle Protection Guidelines for Virginia. These guidelines provide distance and time-of-year restrictions for activities that could disturb nesting or roosting eagles. Guidelines in effect as of this Environmental Assessment would dictate a season closure of December 1. A Section 7 Consultation with the USFWS Virginia Field Office determined that there will be no adverse impact on bald eagles. No adverse effects on migratory birds or inter-jurisdictional fishes are anticipated as a result of establishing a hunt program. Wintering or resident birds (such as bobwhite quail, wild turkey and savannah sparrows), small mammals, and reptiles may experience some flushing, but there is ample cover in the form of marsh, hedgerows, shrubland, and tall grasses for flushed wildlife to repair to, therefore it is expected that this disturbance will be temporary and normal use will resume shortly after the hunt closes each day.

A managed hunt would provide the public with a quality wildlife-dependent recreational opportunity, as is consistent with the requirements of the National Wildlife Refuge Improvement Act of 1997. The Refuge will be open to hunting starting from the State season opening (usually first week in October) opening until November 30. The Refuge may close to other public uses during hunt days, unless these uses can be safely sequestered from locations of hunting activity.

Public Review and Comment: A news release announcing the availability of this determination, and the Draft Environmental Assessment, for a 30-day public review and comment period, was issued to the following media outlets and individuals on December 14, 2001:

Daily Press
Northern Neck News
Rappahannock Record
Rappahannock Times
Richmond Times Dispatch
Westmoreland News
WRAR radio
WNNT radio
Office of Senator John Warner
Office of Senator George Allen
Office of Representative Jo Ann Davis

The only comment received regarding compatibility was one phone call from a private citizen who felt that hunting, in general, was incompatible on national wildlife refuges.

Determination (check one below):

_____ **Use is Not Compatible**

 X **Use is Compatible With the Following Stipulations**

Stipulations Necessary to Ensure Compatibility:

1. All deer hunting will end by December 1 to prevent disturbance to eagle concentration areas and nesting sites. This complies with the Bald Eagle Protection Guidelines for Virginia, jointly developed by the U.S. Fish and Wildlife Service and the Virginia Department of Game and Inland Fisheries.
2. Results of the hunt, to include impacts from hunters and hunter success, will be reviewed annually to ensure that the program contributes to Refuge objectives in managing deer numbers and protecting habitats.

3. Expansions of the hunt area will only occur if sufficient staff resources exist to safely and effectively administer the program without detracting substantially from higher priority activities.

Justification: Hunting is one of the six priority public uses of the National Wildlife Refuge System and has been determined to be a compatible activity on hundreds of other refuges nationwide.

In the absence of a deer hunting program, or other removal process, deer impacts on Refuge habitats are expected to be severe. The following discussion from the Draft Environmental Assessment of the deer hunting proposal outlines these impacts:

The no-action alternative includes long-term negative effects such as potential for disease epidemic (Demarais et al 2000), increase in automobile accident rates, browsing pressure on vegetation and crops, and severe habitat degradation (Cypher and Cypher 1988). Overbrowsing will eventually affect the abundance and distribution of vegetative species and have continued effects on the composition of forest canopy for a long time after the deer herd is reduced. For grasslands, cover would quickly regenerate (Porter 1991), however, species composition may be permanently altered. The effects on vegetation composition and forest regeneration is of great concern to Refuge management for maintaining bald eagle and other migratory bird habitat. The intensity of grazing on woody browse in forest fragments is inversely proportionate to the availability of field forbs (Augustine and Jordan 1998). Pastures and old fields are vulnerable to overgrazing when deer densities are high because they contain more and higher quality forage, especially in spring and summer (Johnson et al.1995). Cumulative effects of grazing over successive years may result in reduced plant reproduction and growth (Augustine and Frelich 1998) and height (Anderson 1994), which exposes sensitive plants and places them at risk of extirpation (Augustine and Frelich 1998). The Refuge is concerned about the impacts this phenomena may have on breeding and wintering bird populations and on the existing exemplary plant communities found on the Refuge.

One management concern is that ungulate populations generally overshoot the ultimate carrying capacity of the habitat before an equilibrium is reached (McCullough 1982). White-tailed deer are more prone to habitat alteration during this process than many other species due to their high reproductive potential (McCullough 1982; McCullough 1997), with substantial impact on the vegetation. Deer foraging habits and preferences can change plant composition and structure over time (Russell and Fowler 1999, Augustine and Jordan 1998, Brown and Parker 1997, Van Deelen et al. 1996, Porter et al. 1991) and such alterations have subsequent impacts on other wildlife, such as songbird species richness and abundance (DeCalesta 1994). This impact is magnified when other factors, such as mild weather, alternative food sources (such as crops), and reduced annual mortality allow populations to quickly increase in numbers.

In addition to a general decrease in habitat quality, impacts of high deer densities include a decline in overall deer population health as evidenced by decreased body weights, increased occurrence of deformities, increased levels of internal and external parasitism, decreased body fat deposits, and disease transmission (Cypher and Cypher 1988, Fischer et al. 1995, Demarais et al. 2000).

If allowed to progress unchecked by natural predators or management, deer reproductive potential can be very high. For example, just one mating pair can grow to 1,000 in 10 years, including natural mortality (Yarrow and Yarrow 1999). Although a weak correlation exists between density and fertility rates (reproduction declines at high densities), substantial reproduction still occurs when densities exceed 50 deer per square kilometer (247 acres) (Swihart 1998). This is because of higher number of adult does in the population, and even though they have lowered reproduction, collectively they produce a large number of offspring each year. The goal of the Refuge, therefore, is not to only manage the deer herd to protect habitat but also to protect the overall health of the herd.

Finally, local communities have relied on hunting to curb population growth and limit crop damage from deer, and to provide outdoor recreation. Many of the Refuge units were once farms that participated in local hunts or were open to local hunt clubs. To permanently retire these units from hunting or some type of population reduction would in effect undermine and impair local ability to curb deer population growth on Northern Neck and would result in a loss of wildlife-dependent recreational opportunity. This loss is contrary to the goals of the NWR system.

Signature: Refuge Manager: Joseph F. McCauley 1/14/02
Signature and Date

Concurrence: Regional Chief: Anthony D. Leger 1/28/2002
Signature and Date

Mandatory 10- or 15-year Re-evaluation Date: January 1, 2017

COMPATIBILITY DETERMINATION

Project Title: Recreational Fishing

Station Name: Rappahannock River Valley National Wildlife Refuge

Date Established: May 28, 1996

Establishing Authorities:

The Emergency Wetlands Resources Act of 1986 (100 Stat. 3582-91) for: "...the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions..." (16 U.S.C. §3901(b); 100 Stat. 3583).

The Endangered Species Act of 1973 (16 U.S.C. §1531-1543), as amended: "...to conserve (A) fish or wildlife which are listed as endangered species or threatened species...or (B) plants..." (16 U.S.C. §1534).

The Land and Water Conservation Fund Act (P.L. 88-578; 16 U.S.C. §4601; 78 Stat. 897) for: "...the acquisition of areas needed for conserving endangered or threatened species of fish, wildlife and plants..." (P.L. 94-422; 90 Stat. 1313).

Purpose for which Established:

The purposes for which the Rappahannock River Valley National Wildlife Refuge was established are:

"...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds ... 16 U.S.C. § 715d (Migratory Bird Conservation Act)," and

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species or (B) plants ... 16 U.S.C. § 1534 (Endangered Species Act of 1973)," and

"... the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ... 16 U.S.C. § 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act of 1986)," and

"...for the development, advancement, management, conservation, and protection of fish and wildlife resources ... 16 U.S.C. § 742f(a)(4) (Fish and Wildlife Act of 1956)."

National Wildlife Refuge System Mission: To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Proposed Use: The following questions and answers provide a concise description of the proposed use.

1. What is the use? Is the use a priority public use? The use is recreational fishing, which is a priority public use of the Refuge System.

2. Where would the use be conducted? We would allow this use on the Hutchinson Tract, the Laurel Grove Tract, the Toby's Point Tract, and the Wilna Tract (see attached Rappahannock River Valley National Wildlife Refuge map). The Wilna Tract is also the site of the Refuge headquarters. We may also allow these uses on other tracts on a case-by-case basis. If they are allowed on other tracts, special use permits would be issued to ensure that the activities follow the stipulations and general compatibility standards set forth in this determination.

General description of the affected areas:

Wilna Tract

The Wilna Tract is approximately 974 acres, and as noted above, is the current location of the refuge headquarters, and the 35-acre freshwater Wilna Pond. Of the 7,711 acres currently under refuge ownership, this is the largest freshwater pond habitat on the refuge. It represents 0.45% of the total refuge ownership. It has an average depth of 5 to 6 feet and sustains a healthy, productive fishery (Galvez and Swihart 2000). Additional facilities that enhance this recreational fishing opportunity include an accessible comfort station and fishing pier. Fishing is conducted from the fishing pier, levee shoreline, and by hand-launch boat, as was approved in the Public Sport Fishing Plan and Compatibility Determination in 1996.

The pier serves both environmental education and fishing uses, but environmental education activities have priority over fishing use. In the event that an environmental education visit is planned, the pier would be closed to fishing for its duration.

There are a variety of habitats including 507 acres of wooded swamp and upland forest, 388 acres of grassland and other early successional habitats, 52 acres of freshwater tidal marsh and open water, nine acres of wet meadow, 2 acres of beachfront on the Rappahannock River, and 16 acres of roads and other administrative areas. The Wilna Tract has nearly one mile of frontage on the Rappahannock River and is accessible from State Route 640 (Sandy Lane).

There is considerable habitat management occurring on the Wilna Tract, including burning and mowing of warm season grasslands, invasive species control, riparian restoration and management, and erosion control (planned). A wide variety of birds use grasslands, shrub lands, and forests year round, as do many resident wildlife species. Bald eagles use the Wilna Tract extensively and bald eagle management guidelines will be followed.

Hutchinson Tract

The Hutchinson Tract is 727 acres located in Essex County along Mt. Landing Creek, a tributary of the Rappahannock River. Fishing at this tract would be facilitated by replacing the existing pier with an accessible fishing pier and floating canoe/kayak launch on Mt. Landing Creek. We

would provide an accessible comfort station, up to two parking areas, and informational signs and brochures containing refuge-specific and state fishing regulations to facilitate this use. Boat access will be provided for hand-launched canoes/kayaks only. A proposed site plan for visitor facilities is attached.

Habitats include 197 acres of planted warm season grasses, 145 acres of planted hardwoods, 240 acres of mixed upland and wet forest types, 134 acres of tidal marsh and open water, and 11 acres of roads and administrative areas. Gravel and dirt roads bisect the tract, one of which extends from Route 17 to Mt. Landing Road (State Route 627). Another road ends at the proposed boat launch and fishing pier on Mt. Landing Creek.

We manage this property primarily for breeding, migrating and wintering birds. Most of our active management (mowing, prescribed burning, invasive species control) is directed toward maintaining approximately 200 acres of grassland habitat. We also monitor and control invasive populations of phragmites in the tidal marshes to maintain the high quality of that habitat for waterfowl, marsh birds, and wading birds.

Laurel Grove Tract

The Laurel Grove Tract is 463 acres located in southern Richmond County. It contains approximately 1.8 miles along Farnham Creek and the 10-acre freshwater Laurel Grove Pond. This pond is relatively deep, averaging over six feet throughout, with abrupt changes in water depth occurring just a few feet from the shoreline (Moss 2007). Marshall Dam, an embankment dam, separates the lake from Farnham Creek.

We propose to allow fishing from the pond shoreline and hand-launched non-motorized boats, canoes, or kayaks. We would provide a small (no more than 10 vehicles) parking lot to facilitate this use, which would be located on the site where three grain silos now stand. The silos have been declared excess property and will be removed. In addition, an interpretive kiosk would be installed adjacent to the parking lot to provide visitors with refuge-specific and state fishing regulations.

The remainder of the tract consists of mixed hardwood and pine forest encompassing 240 acres, 7 acres of tidal marsh, and 1 acre of developed administrative land. In 2003, we worked with partners to restore 205 acres from cropland to forest by planting over 60,000 hardwood saplings on this tract. Within that area, hydrology was restored on 50 acres by ditch plugging and breaking drainage tiles. The tract is bisected by a dirt road.

Management at Laurel Grove is primarily aimed at reducing occurrences of invasive plants. Planted trees are currently providing early successional shrub habitat for nesting, migrating and wintering birds, while mature woodlands are providing habitat needs for a variety of wildlife including forest birds, reptiles and amphibians.

Toby's Point Tract

The Toby's Point Tract is 365 acres located in King George County, near its border with Westmoreland County. This tract adjoins with Wilmont Landing, a county-owned and maintained landing which includes a fishing pier, informational kiosk, boat ramp, and parking

lot. To complement to the existing county pier fishing, we would offer fishing opportunities on approximately 100 feet of refuge shoreline along the Rappahannock River. The existing fishing pier is small, allowing for only one or two anglers at a time. Bank fishing has historically occurred in this area. In cooperation with the county, we would provide informational signs and brochures containing refuge-specific and state fishing regulations.

The remainder of the tract consists of 291 acres of mixed hardwood forest, 66 acres of loblolly forest, and 75 acres of tidal marsh and swamp, with over 2 miles of river frontage. With the exception of invasive species control, this tract is not currently in need of active habitat management, aside from protection and annual white-tailed deer hunts.

As additional lands are acquired, fishing may be considered for other areas.

3. When would the use be conducted? Eventually, we plan to allow public access for recreational fishing on these tracts from official sunrise to sunset. The process of opening each tract will be phased-in as we install appropriate signs, gates, and other measures to control access and ensure safety, quality, and compatibility. If law enforcement problems arise, we may limit hours or otherwise restrict access on a tract by tract basis.

Hunting is permitted on several refuge tracts, including those listed above. During the hunting season, we will either close areas to fishing and other activities not related to hunting, or segregate users to ensure public safety.

4. How would the use be conducted? We are proposing to open the refuge to recreational fishing on these tracts according to State regulations, with some additional restrictions to protect fish and wildlife using the refuge, including the pond areas. We would permit fishing by rod and reel or hook and line only. Angler access will be different at each tract and is detailed above in section 2. No lead sinkers will be permitted on refuge ponds. We will not require lead-free gear in the refuge's tidal waters until such gear is reasonably available. Fishing for largemouth bass will be catch-and-release only in the Wilna and Laurel Grove ponds to maintain the existing health and productivity of the fisheries.

5. Why is the use being proposed? This use is being proposed by the refuge to accommodate one of the priority public uses of the Refuge System. There is a scarcity of public fishing opportunities in the Northern Neck and Middle Peninsula of Virginia, and this is coupled with an increasing demand for access to recreational waters. For those citizens without access to boats, fishing opportunities are limited. According to the 2006 Virginia Outdoor Survey, the second biggest need for outdoor recreation in the next five years is increased public access to recreational waters (VDCR 2007). This is supported by the U. S. Geological Survey's Community Survey that was conducted for the refuge's Comprehensive Conservation Plan (CCP). When asked which additional recreational opportunities community members desired on the refuge, the second highest mean desirability was for fishing (USGS 2007). Additionally, according to the 2002 Virginia Outdoors Plan, there continues to be a lack of opportunity in the region for lake fishing. When compared to the demand, this is projected to be in deficit by 2010 in both the Northern Neck and Middle Peninsula. We have the opportunity to provide public recreational fishing opportunities in manners and locations that will offer high quality wildlife-dependent recreation, and maintain the level of current fish and wildlife values.

Availability of Resources: Facilities or materials needed to support this use include upgrading and maintaining access roads; creating and maintaining parking areas; providing fishing brochures and maintaining our web site to explain fishing regulations and describe permitted activities; constructing a non-motorized boat launch, restroom, and fishing pier at the Hutchinson Tract; purchasing and installing kiosks at the Hutchinson and Laurel Grove tracts; designing and producing panels to provide fishing regulations; and monitoring of the fisheries at the Wilna and Laurel Grove ponds.

Funding for visitor improvements comes from a variety of sources including general management capability funds, challenge cost share projects, grant funds, contributions, and special project funds. We will complete and maintain projects and facilities as funds become available and will use volunteers and partners to help in construction and maintenance.

Over the past five years, approximately \$275,000 has been allocated from special project funds to create infrastructure at the Wilna Pond site. We have \$1 million available from Federal Highway Administration funding to upgrade refuge roads in 2008, including roads at the Hutchinson, Wilna, and Tayloe tracts. In 2007, \$310,000 was allocated for visitor enhancements at the Hutchinson Tract. An additional \$10,000 for portions of the Hutchinson Tract project was received from donations and a Chesapeake Gateways grant. Sufficient staff and maintenance funding within our base budget of nearly \$850,000 is available to make annual progress toward completion of all the projects described above and to maintain those already completed.

Anticipated Impacts on Refuge Purpose: The activities proposed herein are supported by the goals and objectives of the refuge's Draft CCP. Providing compatible wildlife-dependent recreation and education is common to all alternatives listed in the CCP. The Service's preferred alternative lists the following goal related to visitor use of the refuge:

Goal 4: Promote enjoyment and stewardship of our Nation's natural resources by providing quality, wildlife-dependent recreation and education opportunities on refuge lands and waters.

Alternative B, Goal 4, Objective 4.4, Recreational Fishing, relates to this determination.

As noted on page one of this compatibility determination, there are four purposes for establishment and management of this refuge. In general, they relate to four primary conservation and management responsibilities:

1. Migratory birds,
2. Threatened and endangered plant and animal species,
3. Wetlands, and
4. Other fish and wildlife resources.

Following is a discussion on the anticipated impacts of the proposed uses related to the resources listed within refuge purposes.

Potential impacts to birds: An indirect benefit to upland habitats and associated species would derive from careful, strategic management of this fishing program. Public awareness and appreciation of the refuge, its habitats, and resources would inspire some to volunteer or in other ways support the refuge needs and conservation of resources on the landscape in general.

Increases in annual visitor numbers during the daytime (public use sites would be open only from official sunrise to sunset) will surely result from replacing the fishing pier at Hutchinson, constructing parking areas, installing informational kiosks, and other planned activities described herein, although it is difficult to predict a frequency or rate. Visitors at these sites may flush rafting waterfowl or eagles hunting the marshes within view of a trail, launch or pier, although we anticipate that in the winter public use at these locations would be moderate, at least in the early years after opening. Higher rates of public use would occur during the warmer months, when most waterfowl are on northern breeding grounds. Wetland species likely to be disturbed and flushed during the warmer months include bald eagle (fewer than in winter), belted kingfisher, mallard, great blue heron, and basking turtles. The sites are not particularly sensitive, rare, or in close proximity to nest areas, and there are protected and secluded areas nearby where disturbed wildlife can repair to. Disturbance is therefore anticipated to be minor, temporary, and infrequent.

Paths from parking areas to fishing access have the potential to disturb forest interior dwelling bird species at the Laurel Grove and Hutchinson tracts. Direct impacts on wildlife in the form of disturbance can be expected wherever humans have access to an area, and the degree may vary depending on the habitat type. In general, human presence disturbs most wildlife, which typically results in a temporary displacement without long-term effects on individuals or populations. Some species, such as wood thrush, will avoid areas frequented by people, such as developed trails and structures, while other species, particularly highly social species such as eastern tufted titmouse, Carolina chickadee, or Carolina wren, seem unaffected or even drawn to a human presence. When visitors approach too closely to nests, they may cause the adult bird to flush exposing the eggs to weather events or predators. Provided that visitor use is confined to designated areas, disturbance during the breeding season will be limited to those areas. Overall, direct impacts from access to fishing areas would be greatly reduced if facilities avoid area-sensitive habitats (interiors of grasslands and forests) and are confined to a 300-foot edge zone, which is what we plan to implement.

A potential direct negative impact exists for wetland and open waterbird species (such as osprey, herons, and waterfowl) from lost fishing gear; specifically, hooks, lures, and litter, or becoming entangled in fishing line or hooks. Ingestion of lead sinkers is another source of concern throughout the region, but use of lead sinkers is not permitted on refuge ponds. The extent to which these bird species are impacted by fishing tackle currently is unknown. We will continue to work with our fisheries assistance office and the State in implementing a public education and outreach program on these issues. Increased law enforcement is also planned.

Potential impacts to threatened and endangered species: Despite their removal in 2006 from the Federal List of Endangered and Threatened Species, we included bald eagles in this section due to the fact they were a focal species during refuge establishment and because of the extra protection they are afforded under the Bald and Golden Eagle Protection and Migratory Bird Acts. The only federal-threatened species confirmed to exist on the refuge is the sensitive joint-vetch.

Permitting public access to any waterfront or marsh managed by the refuge holds the possibility of impacting bald eagles or sensitive joint vetch. Impacts may either be displacement or

temporary disturbance depending extent of use of a given site by visitors and eagles. The improvements planned for the fishing program will not impact sensitive joint vetch. However, bald eagles use the trees along Mount Landing Creek (Hutchinson Tract), Laurel Grove Pond, and Wilna Pond, but not in high concentrations. The shoreline at Toby's Point is located in a concentration area. As trees mature and forest riparian buffers are improved, sites with low concentrations will likely increase in importance to bald eagles.

We will avoid potential adverse impacts to bald eagles by strictly following the management guidelines developed in consultation with the Virginia Department of Game and Inland Fisheries and the Center for Conservation Biology. These include sight and distance setbacks from nests and concentration areas, and time-of-year restrictions.

Potential impacts to wetlands: Potential adverse impacts to wetlands could arise if facilities were improperly placed in wetland habitats, if public use were allowed to occur directly in wetlands, or if erosion of sediments into wetlands was allowed to occur during facility construction.

The only facilities proposed for construction in wetlands are the pier and canoe/kayak launch at the Hutchinson Tract. Together, construction of these facilities will cause temporary and minimal (less than 0.01 acre) impacts to wetlands. We will employ silt fencing and other best management practices during construction of any facilities in proximity of wetlands to avoid runoff of sediments.

Many of our interpretive messages included on kiosk panels remind visitors of the importance of wetlands and the many beneficial functions they provide to society, including wildlife habitat, flood protection, groundwater recharge and nutrient uptake.

Potential impacts to other fish and wildlife: Direct impacts on wildlife in the form of disturbance can be expected wherever humans have access to an area, and the degree may vary depending on the habitat type. In general, human presence disturbs most wildlife, which typically results in a temporary displacement without long-term effects on individuals or populations.

Major concerns of any refuge fishing program are accidental or deliberate introductions of non-native fish (used for bait), accidental introduction of invasive plants, pathogens, or exotic invertebrates attached to fishing boats, and over-harvesting. The refuge does not permit use of live minnows in order to prevent the likelihood of introductions of non-native fish. Another common concern is the reduction or alteration of prey base important to fish-eating wildlife. Refuge-specific regulations address this concern by limiting bass fishing to catch and release only at Wilna and Laurel Grove ponds. The current fishing program of the refuge follows the Virginia state regulations and would adopt any State harvest limits that should become applicable to the fish species in these ponds. These limits are set to ensure that harvest levels do not cumulatively impact native fish resources to the point they are no longer self-sustainable. We also follow recommendations of Service fisheries biologists who conduct periodic sampling of refuge ponds. We plan to continue to work with State conservation officers in implementing a public education and outreach program, and increased law enforcement is also planned to address the above concerns.

Mammals in Virginia occupy a diverse array of habitat types, ecological niches and food webs and play an important role in the ecosystems in the refuge boundary. As a taxonomic group, mammals will also benefit from the refuge land protection and management actions relative to riparian habitats, forests, grasslands, shrub, and wetlands proposed for listed species, waterfowl, and migratory birds. Likewise, the refuge will benefit from careful attention to the impacts to mammals resulting from any of its activities. We evaluated the management actions proposed for this use for their potential to benefit or adversely affect large and small, aerial, terrestrial, and wetland mammals and believe that they should have no long-term impact on mammal use of the refuge.

Protection and good stewardship of the area's herpetofauna is another priority of the refuge, and fits into nearly all the goals for wetlands, uplands, and riparian habitats. We evaluated the public uses described herein for their potential to benefit or adversely affect amphibians and reptiles or their habitats used for mating, reproduction, over-wintering, and foraging. Although most species that occur on the refuge are very common and widespread, there is concern for two species of turtle: eastern box and spotted turtles. In addition, amphibians everywhere are considered to be experiencing a general decline. Some areas are experiencing loss of mixed mature forest due to development or high rates of conversion to timber farms. This impacts vernal pools needed by amphibians for over-wintering and reproduction. No vernal pools will be impacted by these proposed activities. Public outreach and education efforts by the refuge that emphasize buffering of wetlands, connectivity and easy access between forest, grassland, and wetlands, protection of vernal pools, and augmentation of patch size will benefit amphibians and reptiles on an even larger scale where embraced by other landowners.

Sometimes maintenance actions for public use may involve preparations or outcomes that have direct negative impacts to amphibians and reptiles. Mowing of grassy access roads and public use trails that lead to these proposed fishing areas occasionally destroys turtles, snakes or frogs if conducted during times of movement (warm months). The best way to minimize this direct type of negative impact is to keep public use and access roads mowed short so that they do not become attractive habitat. However, in many cases it will be impossible to find a perfect time to carry out maintenance actions that will completely avoid conflict for wildlife.

Construction of gravel parking areas and trails leading to the fishing areas pose the potential threat of blocking access between different habitat types, depending on the placement, length, width, and substrate material of the lot and trails leading to the fishing sites. Some salamander species will not cross openings that are too wide or dry, bare ground (Vinson 1998), thus earthen trails, if exposed to sunlight could become dry enough to form a barrier. Gravel roads or trails, even though permeable, may also act as a barrier to salamander movement (Marsh et al. 2005). The planned graveled trails and parking areas are for wheelchair access and will therefore be located on level terrain, avoiding ravines which are home to amphibians and reptiles. At most these trails will be five miles in length on four tracts, and their widths no more than six feet. Other walking trails will be simple cleared paths and perhaps mulched in some locations, but these too will avoid moist ravines close to amphibian habitat.

Disturbance to basking or nesting turtles may occur where public use is concentrated at points where land and water interface. Basking turtles can usually find alternate resting surfaces. Nesting turtles, once engaged in the act of digging usually will not allow their attention to be

drawn to anything else, and at such time are vulnerable to predators. A turtle wishing to make landfall to attempt egg-laying however, may be dissuaded by the presence of humans at the site. Because there will be ample wetland-forest-grassland interface elsewhere, we expect that the cumulative impact of parking lots, roads, and trails to amphibians and reptiles at the landscape scale will be insignificant.

In summary, our research, observations and knowledge of the area provide no evidence that cumulatively, the visitor activities we propose to allow will have an unacceptable effect on wildlife resources or their habitats. We do not expect a substantial increase in the cumulative effects of visitor use from this program. Refuge staff will monitor and evaluate the effects of visitor use, in collaboration with state agencies and partners, to discern and respond to unacceptable impacts on wildlife or habitats.

Public Review and Comment: This determination was made available for a 30-day public review and comment period in conjunction with the release of the Draft CCP and Environmental Assessment for the refuge.

Determination (check one below):

Use is Not Compatible

 X

Use is Compatible With the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

1. All activities will comply with the Bald Eagle Protection Guidelines for Virginia, jointly developed by the U.S. Fish and Wildlife Service and the Virginia Department of Game and Inland Fisheries, in consultation with the Center for Conservation Biology.
2. Results of the fishing program will be reviewed annually to ensure that the program contributes to refuge objectives in managing quality fisheries and protecting habitats.
3. Lead sinkers and other lead tackle will be prohibited on refuge ponds to prevent ingestion, and possible lead poisoning, by wildlife.
4. Fishing will be permitted only in designated areas to prevent erosion and degradation of wetlands and water quality.
5. Fishing will follow all State regulations as well as tract-specific refuge regulations.

Justification: Fishing is one of the six priority public uses of the National Wildlife Refuge System and have been determined to be a compatible activity on hundreds of other refuges nationwide. The Refuge System Improvement Act of 1997 instructs refuge managers to seek ways to accommodate these six activities. The refuge properties described in this determination offer a wide variety of habitats and compatible wildlife-dependent recreational opportunities.

Impacts from this proposal, both short-term and long-term, direct, indirect, and cumulative, are expected to be minor and are not expected to diminish the value of the refuge for its stated purposes. The area affected by the proposed use represents a small fraction of the refuge land area. Available parking and size of the facilities will typically limit use at any given time, except during special events. Monitoring the health and continued sustainability of the fisheries at Wilna and Laurel Grove ponds will provide a basis for future recommendations to ensure the continued productivity of refuge habitats.

In accordance with 50 CFR 26.41, opening the Rappahannock River Valley National Wildlife Refuge to fishing, as described herein, will not materially interfere with, or detract from, the fulfillment of the National Wildlife Refuge System mission or the purposes for which the refuge was established.

Signature: Refuge Manager: Joseph F. McCauley 12/14/09
(Signature and Date)

Concurrence: Regional Chief: Anthony D. Legen 12/21/2009
(Signature and Date)

Mandatory 15-year Re-evaluation Date: December 21, 2024

References:

Commonwealth of Virginia, Department of Conservation and Recreation, Division of Planning and Recreation Resources. 2002. *Virginia Outdoors Plan*. 445pp.

Galvez, John I. and Swihart, Gary L. 2000. *Assessment of Fishery Resources and Water Quality Parameters at Lake Wilna – Rappahannock River Valley National Wildlife Refuge, Virginia*. U.S. Fish and Wildlife Service Office of Fishery Assistance, Gloucester, Virginia. 26pp.

Marsh, D.M., G.S. Milam, Gorham, N.P. N.G. Beckman. 2005. Forest roads as partial barriers to terrestrial salamander movement. *Conservation Biology*. 19:6, 2004-2008.

Moss, Lisa. 2007. *Fishing and Aquatic Resources Management Plan, Rappahannock River Valley National Wildlife Refuge, Laurel Grove, Farnham, Virginia*. U.S. Fish and Wildlife Service Gloucester Fishery Resources Office, Charles City, Virginia.

USGS. 2007. Draft Community Survey Results for Rappahannock River Valley National Wildlife Refuge: Completion Report.

Vinson, M. 1998. Effects of recreational activities on declining anuran species in the John Muir Wilderness, CA. Missoula, MT: University of Montana. 83 p. Thesis.

Virginia Department of Conservation and Recreation. 2007. Draft Virginia Outdoors Plan http://www.dcr.virginia.gov/recreational_planning/vop.html

Map B.8. Rappahannock River Valley National Wildlife Refuge and its Regional Setting



FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Rappahannock River Valley NWRUse: Cooperative Farming

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge OCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(d) Is the use consistent with public safety?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(g) Is the use manageable within available budget and staff?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(h) Will this be manageable in the future within existing resources?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ☒ No ☐

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ☐Appropriate ☒Refuge Manager: Joseph F. Van CleaveDate: December 2, 2006

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the OCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: Joe P. SeaneDate: 1/10/07

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Justification for Cooperative Farming as an Appropriate Use
Eastern Virginia Rivers NWR Complex
Rappahannock River Valley NWR

Rappahannock River Valley National Wildlife Refuge was established

“...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds ... 16 U.S.C. § 715d (Migratory Bird Conservation Act),” and

“... to conserve (A) fish or wildlife which are listed as endangered species or threatened species or (B) plants ... 16 U.S.C. § 1534 (Endangered Species Act of 1973),” and

“... the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ... 16 U.S.C. § 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act of 1986),” and

“for the development, advancement, management, conservation, and protection of fish and wildlife resources ... 16 U.S.C. § 742f(a)(4) (Fish and Wildlife Act of 1956).

The Final Environmental Assessment, including a Finding of No Significant Impact (FONSI), establishing the refuge was released in February 1995. The EA contained many references pertaining to cooperative farming, including the following:

“This proposal should not to be viewed (sic) as being in competition with agricultural land use. Cooperative farming agreements will allow the continuation of farming on some agriculture lands that may be incorporated in the Refuge” (FONSI, page 3).

“Impact to Agriculture: The Service does not anticipate the cessation of all farming on those lands it acquires, and does not believe that Refuge establishment will have a significant adverse impact upon farming. Cooperative farming agreements will be initiated where and when appropriate. The opportunity also exists to demonstrate sustainable agriculture practices on some refuge lands that may be acquired” (Summary, page iii).

“At Cat Point Creek,...Cooperative farming and shoreline preservation, timber, and grassland/brushland management actions could be emphasized....It is anticipated that a number of public use and interpretive programs could be initiated such as ... sustainable agriculture oriented grassland and cropland management...” (Final EA, page 7).

Beginning with the first refuge tract purchased in 1996, we have acquired approximately 1,665 acres of open land. The majority of these fields were in row crops, with lesser amounts in pasture and hayfields. We are now managing approximately 750 acres of these open lands as native grassland/early successional habitat. We have converted approximately 520 acres into native hardwoods or shrubs through planting, while approximately 170 acres are being allowed to naturally succeed to later vegetative stages or are being prepared for planting to native hardwoods. The remaining 225 acres continue to be farmed, and are the subject of this determination. These acres represent 13.5% of the total agricultural land purchased for the refuge since its inception and 3.5% of the total area of the refuge purchased in fee title.

In 1997, Congress passed the National Wildlife Refuge System Improvement Act. Among the provisions of the Act were directives concerning compatibility and the biological integrity, diversity and environmental health of the refuge system. New refuge system policies on Compatibility, and Biological Integrity, Diversity and Environmental Health (Integrity Policy) were issued in 2000 and 2001, respectively. The Integrity Policy directed that refuge habitats be managed to support historic conditions, defined as the “composition, structure, and functioning of ecosystems resulting from natural processes that we believe, based on sound professional judgment, were present prior to

substantial human related changes to the landscape.” Further, the policy states that “we do not allow refuge uses or management practices that result in the maintenance of non-native plant communities unless we determine there is no feasible alternative for accomplishing refuge purpose(s).” The policy uses farming to illustrate this directive: “For example, where we do not require farming to accomplish refuge purpose(s), we cease farming and strive to restore natural habitats.”

In consultation with the literature and with experts in the field of bird conservation, we believe that the refuge has an important role to play in grassland management. However, in many ways, we are still in the early stages of understanding the best methodologies for establishing and maintaining grassland habitats on the refuge. Over the past several years, we have made significant changes to our grassland management, including correcting ill advised planting regimes, preparing to convert planted warm season grass fields to riparian forest, experimenting with methods to control woody encroachment, and employing other adaptive management approaches as we seek to refine the program. We have used the cooperative farming agreement to help us achieve many of these habitat management activities. The cooperator has assisted with field preparation, planting, mowing, disking, and invasive species control to help establish new grassland fields and prepare other fields for restoration to native forest. Because we are still in the process of fully restoring former agricultural fields, we are not in the position to undertake new restoration of the 225 acres still in row crop production. With limited staff resources to plan and implement restoration, and little expectation of adding new staff within the next five years, we propose to keep lands in agricultural production until we can successfully restore them to native habitats. We believe this can be accomplished in a five year period, assuming stable budgets and staff, and with the continued assistance provided through the cooperative agreement.

We propose to use cooperative farming as an interim measure to keep fields open in preparation for conversion to native plants, and as a means to help us properly establish newly converted early successional habitats. This has been the primary justification for cooperative farming since the refuge was established in 1996. Our cooperative farming program is an integral component of our overall habitat restoration and management efforts as we work toward full compliance with refuge system policies on compatible uses and biological integrity, diversity, and environmental health. Therefore, we have determined that cooperative farming as described, and for the duration proposed, is an appropriate use.

COMPATIBILITY DETERMINATION

Project Title: Cooperative Farming

Station Name: Rappahannock River Valley National Wildlife Refuge

Date Established: May 28, 1996

Establishing Authorities:

The Emergency Wetlands Resources Act of 1986 (100 Stat. 3582-91) for: "...the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions..." (16 U.S.C. §3901(b); 100 Stat. 3583).

The Endangered Species Act of 1973 (16 U.S.C. §1531-1543), as amended: "...to conserve (A) fish or wildlife which are listed as endangered species or threatened species...or (B) plants..." (16 U.S.C. §1534).

The Land and Water Conservation Fund Act (P.L. 88-578; 16 U.S.C. §4601; 78 Stat. 897) for: "...the acquisition of areas needed for conserving endangered or threatened species of fish, wildlife and plants..." (P.L. 94-422; 90 Stat. 1313).

Purpose for which Established:

The purposes for which the Rappahannock River Valley National Wildlife Refuge was established are:

"...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds ... 16 U.S.C. § 715d (Migratory Bird Conservation Act)," and

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species ... or (B) plants ... 16 U.S.C. § 1534 (Endangered Species Act of 1973)," and

"... the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ... 16 U.S.C. § 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act of 1986)," and

"for the development, advancement, management, conservation, and protection of fish and wildlife resources ... 16 U.S.C. § 742f(a)(4) (Fish and Wildlife Act of 1956)."

National Wildlife Refuge System Mission: To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Proposed Use: The following questions and answers provide a concise description of the proposed use.

1. What is the use? Is the use a priority public use? The use is cooperative farming. Cooperative farming is not a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997.

2. Where would the use be conducted? We would allow this use on the Tayloe Tract (Tract 12), located off Naylor's Beach Road in Richmond County, Virginia. The Tayloe Tract is approximately 1,112 acres. The area proposed for use is contained within 12 fields ranging in size from 3.2 to 42 acres, and totaling 225 acres (see maps B.9 and B.10). Other habitats on the Tayloe Tract include mixed hardwood and pine forest (\pm 470 acres), tidal marsh (\pm 180 acres), planted grassland (\pm 92 acres), open water (\pm 76 acres), old field (\pm 27 acres), planted hardwoods/shrubs (\pm 33 acres), and moist soil (\pm 9 acres). Of the total acreage on the tract, approximately 161 acres were in row crops or pasture at the time of refuge establishment, and have been converted to native plants.

Other, yet un-acquired tracts may be temporarily added to the cooperative farming program pending conversion to native habitats.

There are several structures on the Tayloe property, all of which are scheduled for demolition or removal. They include six sheds/barns, two grain silos, and one office trailer. We have removed one house, two sheds and one large dairy barn since 2003. The house will be replaced with a modular building to be used as refuge quarters.

The tract is open by reservation only for wildlife observation, environmental education, and photography. Hunting of white-tailed deer is permitted during the fall.

3. When would the use be conducted? Farming would occur all year long via planting and harvesting of small grains (wheat, barley) and large grains (corn and soybeans). Corn is typically planted in late spring and harvested in late summer/early fall. Soybeans are planted in late spring/early summer, and harvested in late fall. Small grains are typically planted in late fall and harvested in late spring/early summer. Application of fertilizer, lime, and pesticides occurs before and after planting, but prior to harvest.

4. How would the use be conducted? We would manage the farming program through a cooperative agreement with a local farmer. We followed guidance from the Refuge Manual in selecting the individual with which to enter into an agreement. Field rental rates are determined by taking the average of rates from the local area based on the Custom Rate Survey of the Northern Neck and Middle Peninsula, conducted by the Westmoreland County Extension Agent. Rather than making cash payments, the cooperator conducts farming-related services on the refuge of an amount equal to the amount of rent. Farming-related services eligible for inclusion into the agreement are: providing native grass and other native seed, planting, plowing, disking, mowing, and applying herbicide. The cooperative farming agreement is a component of

the refuge's annual habitat management program and activities conducted by the cooperator support the accomplishment of refuge habitat management objectives.

We follow best management practices in the implementation of the cooperative farming program. Forested or grass buffers are established between all farm fields and any adjacent wetlands and streams. "No-till" practices are also employed to the maximum extent possible. We prepare pesticide use proposals for application of all pesticides, and only those that are shown to not impact fish and wildlife resources are approved.

We will seek approval to use genetically modified crops, specifically Roundup™ Ready soybeans and corn. These products are widely-used on farms around the refuge, including those adjacent to the Tayloe Tract. We have reviewed the literature on the effects of Roundup Ready soybeans and corn, and of glyphosate herbicide, on fish and wildlife resources and can find no definitive studies that show that use of these products, as is proposed herein, would materially affect refuge or System purposes. Some of the issues surrounding use of Roundup Ready crops are summarized below:

- a. Cultivation of herbicide tolerant crops dramatically increases use of herbicides – According to a 2002 USDA report, adoption of GE (genetically engineered) crops including Bt cotton and herbicide tolerant corn, cotton and soybeans, resulted in a decline of 19.1 million-acre treatments in 1997. This equated to a decline of about 2.5 million pounds of active ingredients. While the pounds of active ingredients such as glyphosate increased on soybeans fields, "this substitution displaced other synthetic herbicides that are nearly three times as toxic to humans and that persist in the environment twice as long as glyphosate" (Fernandez-Cornejo and McBride 2002). Locally, this statement is verified by the removal of Prowl (manufactured by BASF, active ingredient: pendimethalin) from the list of requested herbicides for soybeans in favor of glyphosate. Pendimethalin is more harmful to the applicator and significantly (approximately 10 times) more toxic to fish (rainbow trout) and aquatic invertebrates (*Daphnia magna*) than glyphosate.
- b. Use of Roundup harms and kills amphibians – There are varying opinions on this claim in the literature, but the surfactant used in some glyphosate products appears to be more toxic to aquatic organisms than glyphosate itself. On the refuge, we do not believe that the potential effects of commercial surfactants will harm aquatic organisms due to the fact that all our fields are buffered from streams and wetlands, and herbicides are applied from ground equipment (tractors), thereby reducing the potential for drift into wetland sites.
- c. Widespread use of glyphosate tolerant crops has led to chemical resistance by some weeds – The most often cited example is resistance by mare's tail or horseweed. We have not experienced this phenomenon on the refuge. Our experience with mare's tail is that it comes in strong during the first year or two after a field is taken out of production, and then it virtually disappears as other plants, either planted or volunteer, take over.

5. Why is the use being proposed? We propose to use cooperative farming as an interim measure to keep fields open in preparation for conversion to native plants, and as a means to help us properly establish newly converted early successional habitats. This has been the primary justification for cooperative farming since the refuge was established in 1996. Our cooperative farming program is an integral component of our overall habitat restoration and management efforts as we work toward full compliance with refuge system policies on compatible uses and biological integrity, diversity, and environmental health.

Beginning with the first refuge tract purchased in 1996, we have acquired approximately 1,665 acres of open land. The majority of these fields were in row crops, with lesser amounts in pasture and hayfields. We are now managing approximately 750 acres of these open lands as native grassland/early successional habitat. We have converted approximately 520 acres into native hardwoods or shrubs through planting, while approximately 170 acres are being allowed to naturally succeed to later vegetative stages or are being prepared for planting to native hardwoods. The remaining 225 acres continue to be farmed, and are the subject of this compatibility determination. These acres represent 13.5% of the total agricultural land purchased for the refuge since its inception and 3.5% of the total area of the refuge purchased in fee title.

The Draft Environmental Assessment to establish the Rappahannock River Valley National Wildlife Refuge was released for public review and comment in July 1994, and the Final Environmental Assessment, including a Finding of No Significant Impact (FONSI), was released in February 1995. The following statements pertaining to cooperative farming are contained in the Final Environmental Assessment, and reflect Service policies at the time of refuge establishment:

“This proposal should not to be viewed (sic) as being in competition with agricultural land use. Cooperative farming agreements will allow the continuation of farming on some agriculture lands that may be incorporated in the Refuge” (FONSI, page 3).

“Impact to Agriculture: The Service does not anticipate the cessation of all farming on those lands it acquires, and does not believe that Refuge establishment will have a significant adverse impact upon farming. Cooperative farming agreements will be initiated where and when appropriate. The opportunity also exists to demonstrate sustainable agriculture practices on some refuge lands that may be acquired” (Summary, page iii).

“Once acquired, habitats would be managed as part of the National Wildlife Refuge System in accordance with all applicable Federal rules and regulations contained in Title 50, Code of Federal Regulations. Management policies and procedures are contained in the U.S. Fish and Wildlife Service Manual....Techniques might include shoreline preservation by establishment of vegetative filter strips along the river, forest management grassland mowing and disking, prescribed burning and, cooperative farming” (Final EA, page 6).

“At Cat Point Creek,...Cooperative farming and shoreline preservation, timber, and grassland/brushland management actions could be emphasized....It is anticipated that a number of public use and interpretive programs could be initiated such as ... sustainable agriculture oriented grassland and cropland management...” (Final EA, page 7).

“Land Use – Open space farms and wildlands are resources which are declining in the region and nationwide. Some areas can be kept in a manner that is usable for wildlife and recreation, but creation of new wild space in the true sense is impossible. Under Service acquisition, there would be little or no major change from present land-use patterns. Some marginal agricultural lands may be allowed to revert to later successional stages, especially along the river shoreline, to prevent erosion and provide habitat cover. Agricultural practices on some remaining lands will be modified to provide food and cover sources for migratory birds. Acquisition monies can be used to purchase conservation easements from landowners who are interested in continuing their current use, while selling their development rights. Such a program would allow former landowners or tenant farmers to continue raising crops on certain acquired lands, or portions thereof, while also providing wildlife benefits. Lease back agreements are also possible which would give the seller or others who rent the property an opportunity to continue using the land for crop raising. Agricultural land could remain in production, thus, helping to maintain the livelihood of the farmer. The farmer/landowner would have the first refusal option to enter into a lease back agreement, while the tenant or party renting the land would be given the second option” (Final EA, page 42).

There are other references to cooperative farming in the EA that are similar in nature to those above.

In 1997, Congress passed the National Wildlife Refuge System Improvement Act. Among the provisions of the Act were directives concerning compatibility and the biological integrity, diversity and environmental health of the refuge system. New refuge system policies on Compatibility, and Biological Integrity, Diversity and Environmental Health (Integrity Policy) were issued in 2000 and 2001, respectively. The Integrity Policy directed that refuge habitats be managed to support historic conditions, defined as the “composition, structure, and functioning of ecosystems resulting from natural processes that we believe, based on sound professional judgment, were present prior to substantial human related changes to the landscape.” Further, the policy states that “we do not allow refuges uses or management practices that result in the maintenance of non-native plant communities unless we determine there is no feasible alternative for accomplishing refuge purpose(s).” The policy uses farming to illustrate this directive:

“For example, where we do not require farming to accomplish refuge purpose(s), we cease farming and strive to restore natural habitats.”

The Improvement Act also mandated that all refuges complete a comprehensive conservation plan by 2012. These plans address all aspects of refuge management for a 15-year period. Rappahannock River Valley began pre-planning in 2001 and currently (2006) is in the midst of preparing its plan, scheduled for completion in August 2007. As part of the planning analysis, refuge staff conducted investigations into historic conditions. While the predominant upland

vegetation appears to have been eastern deciduous forest, evidence exists to suggest that large clearings existed as well, due to naturally occurring wildfire, fires set by Native Americans, and, further west in Virginia, grazing by bison (Ingram 2006). At the time of European contact, the forest landscape in much of the East contained open stands of trees and some grasslands (savannahs) (Davis 1981), shaped by short-interval, low-intensity fires. Grasslands and prairies were common in Ohio, Pennsylvania and Virginia, primarily as a result of introduced or naturally-occurring fire (Brown 2000). Many open areas had been created by slash-and-burn agricultural practices of Native Americans, and as a result of gathering and clearing for firewood (Day 1953, Russel 1998). Fire (whether natural or man-made) and drought since the end of the last ice-age also created park-like woodlands and stretches of open grasslands throughout the Bay area (Grumet 2000). A contemporary site in Virginia also points to an extensive landscape of grasslands or spruce savannahs as it contains the skeletons of many grassland vertebrate species (Askins 2002).

As summarized by Mitchell, et al (2000), many grassland dependent birds are experiencing significant population declines. As noted in the Partners in Flight Bird Conservation Plan for the Mid-Atlantic Coastal Plain (Watts 1999), plan partners (including the Fish and Wildlife Service) control many of the most important grassland areas in the region, and therefore have a heightened opportunity and responsibility to appropriately manage these lands for grassland-dependent birds, particularly the grasshopper sparrow during the breeding season, and several other grassland-obligates during the winter.. As mentioned above, we currently manage approximately 750 acres of early successional habitat with a focus on breeding grasshopper sparrows and wintering savannah sparrows.

Establishment of native warm season grasslands requires significant early investment, including field preparation, planting, invasive species control, and general weed control to establish the stands. Allowing fields to naturally seed themselves requires considerably less investment of time and funds. These differing methods of grassland establishment produce different vegetative communities, but both are used by grassland dependent birds. The refuge is evaluating the relative abundance of birds using the different field types to determine which better achieves refuge objectives.

Maintenance of grassland fields also requires intensive management to keep out woody plant species, control invasive species, reduce the build-up of thatch, and maintain the vigor of the grasses. We maintain grassland fields by prescribed burning, mowing, disking, and application of approved herbicides. Without regular maintenance, fields would rapidly succeed to shrub, and eventually forest, habitats. Fields that are taken out of agricultural production will, without management, begin growing tress within two years, making reclamation of these fields into grassland much more difficult and expensive. Burning is ineffective in removing trunks of small trees and mowing leaves stobs that can puncture tractor tires in the immediate subsequent years.

In consultation with the literature and with experts in the field of bird conservation, we believe that the refuge has an important role to play in grassland management. However, in many ways, we are still in the early stages of understanding the best methodologies for establishing and maintaining grassland habitats on the refuge. Over the past several years, we have made significant changes to our grassland management, including correcting ill advised planting

regimes, preparing to convert planted warm season grass fields to riparian forest, experimenting with methods to control woody encroachment, and employing other adaptive management approaches as we seek to refine the program. We have used the cooperative farming agreement to help us achieve many of these habitat management activities. The cooperator has assisted with field preparation, planting, mowing, disking, and invasive species control to help establish new grassland fields and prepare other fields for restoration to native forest. Because we are still in the process of fully restoring former agricultural fields, we are not in the position to undertake new restoration of the 225 acres still in row crop production. With limited staff resources to plan and implement restoration, and little expectation of adding new staff within the next five years, we propose to keep lands in agricultural production until we can successfully restore them to native habitats. We believe this can be accomplished in a five year period, assuming stable budgets and staff, and with the continued assistance provided through the cooperative agreement.

In the interim, lands that remain in agriculture will not be as beneficial to migratory birds and other wildlife as they would be if restored to native vegetation. They will have no value as breeding habitat. However, these fields do have value as foraging areas for birds throughout the year. Large numbers (>1,000) of Canada geese have been observed feeding on waste grain in both corn and soybean fields after harvest. Eastern meadowlarks prefer open ground for foraging during the winter and are often seen feeding in corn and soybean stubble. Grasshopper sparrows and other birds have been observed feeding on insects in growing soybeans fields adjacent to restored fields.

It is clear that, when viewed in the context of the overall habitat management status and capacity of the refuge, that cooperative farming as it is being practiced, and for the limited duration proposed, contributes to the purposes of the refuge and the mission of the refuge system by significantly adding to the refuge's ability to successfully restore and manage native habitats over the long term.

Availability of Resources: With the exception of staff time necessary to administer it, the cooperative farming program is self sustaining. The disking, planting, mowing, herbicide application, and other farming practices used to help restore native habitats are conducted in exchange for use of the 225 acres for agricultural production. Staff hours for cropland management in FY 2006 were estimated at 66 hours, primarily from the deputy refuge manager and refuge biologist, with oversight by the refuge manager. Costs to administer the cooperative farming program were approximately \$2,800 in FY 2006. This represents 0.28% of the refuge operational budget in FY 2006 and 0.99 % of the combined salaries of the three staff involved.

Anticipated Impacts on Refuge Purpose: We are scheduled to complete our Comprehensive Conservation Plan in 2007. In the interim, we are using the broad objectives set forth in the Environmental Assessment prepared during the establishment of the Refuge in 1995. They are as follows:

- (1) To preserve and enhance the refuge's land and water in a manner that will conserve the natural diversity of fish, wildlife, plants and their habitats for present and future generations;

- (2) To protect, restore and enhance ecologically significant wetland habitats;
- (3) To conserve and enhance populations of fish, wildlife, and plants within refuge boundaries; to manage and perpetuate the migratory bird resource including populations of waterfowl, neotropical migrants, raptors, passerines, and marsh and water birds;
- (4) To protect, restore and enhance interjurisdictional fish populations;
- (5) To protect and enhance endangered and threatened species populations;
- (6) To protect and enhance water quality of aquatic habitats with the refuge and the River;
- (7) To fulfill international treaty obligations of the United States with respect to fish and wildlife and their habitats, and
- (8) To provide opportunities for compatible scientific research, environmental education, and fish and wildlife-oriented recreation.

In terms of the impacts related specifically to interim objectives of the Refuge, we expect no impact to the **diversity** of fish, wildlife or plants now occurring on the Refuge. The relatively small impact area (3.5% of the Refuge area) suggests that no plant or species of fish or wildlife will be extirpated from the Refuge. While the croplands will not be as valuable to the diversity of wildlife as they will be when restored, they do provide feeding habitat, and add to the local diversity of habitats within the refuge. Their proximity to restored lands on the Tayloe Tract adds more to their value than croplands in a solely agricultural setting (Spencer pers. comm.).

Wetlands will be not be impacted due to the vegetated buffers strips surrounding all agricultural fields. Buffer strips along the most sensitive wetland area, Cat Point Creek, are greater than 100 feet in width. Buffers of only 25 meters (77 feet) have been shown to reduce sediments due to surface runoff by 98%, and nitrogen and phosphorous due to surface runoff by almost 80% (Gillam et al 1997).

Habitat available to **migratory birds** will be of lesser value on lands now in crops than it would be if restored to native habitats. However, when viewed within the scope of the refuge's current ability to successfully complete restorations now underway, the short term loss is outweighed by the long term gain in managing all former agricultural lands methodically to maximize their long term value to migratory birds and other wildlife.

No **interjurisdictional fish** will be impacted by this program, due to reasons stated above concerning wetland impacts.

With regard to **threatened and endangered species**, the Refuge will abide by the joint Service-State Bald Eagle Protection Guidelines for Virginia. These guidelines provide distance and time-of-year restrictions for activities that could disturb nesting or roosting eagles. The farming operation at the Tayloe Tract is a continuing activity that has been in existence for decades if not

centuries. There will be no additional impact to bald eagles above what has occurred historically. In fact, since the refuge purchased the property and established buffers along Cat Point Creek, the distance between farmed fields and potential bald eagle habitat has increased. Planting and harvesting activities are well spaced during the year, so any disturbance will be minimal and short lived. We received concurrence from a Section 7 Consultation with the USFWS Virginia Field Office indicating that this use is not likely to adversely impact bald eagles.

Water quality will not be impacted for reasons stated above when describing impacts to wetlands.

United States' **treaty obligations** will not be adversely affected since migratory bird populations will be protected and enhanced in the long term. Short term loss of nesting habitat will occur, but since birds are not known to nest in these fields (unpublished refuge data 2002), no mortality is expected to occur due to farming operations.

The cooperative farming program presents opportunities to satisfy a refuge objective, and a goal of the Improvement Act, for compatible **wildlife -dependent recreation, specifically interpretation**. Farming and forestry have been the predominate land uses in the area surrounding the refuge for centuries. Farming and forestry also have a rich tradition in the field of wildlife management. It was not so long ago that growing crops for wildlife was one of our primary management techniques on refuges. While we have evolved into restoring and managing native habitats, and by policy, toward historic conditions, this change in philosophy is not well recognized or understood by the general public. While having cooperative farming on the land is not necessary to interpret this message, it does present an opportunity for visitors to witness the evolution in progress. In the interim period while farming is on-going, it also presents opportunities to interpret sustainable farming and best management practices in use. The Tayloe Tract is one of the best examples of soft-edge buffers in Richmond County (Hall pers. comm.).

Public Review and Comment: A news release announcing the availability of this determination for a 15-day public review and comment period, was issued to the following media outlets and individuals on October 11, 2006:

Rappahannock Times	Richmond Times Dispatch
Northern Neck News	The Journal
Southside Sentinel	Daily Press
Northumberland Echo	WRAR
Westmoreland News	WNNT
The Free Lance-Star	WKWI
Rappahannock Record	NorthernNeckToday.com
The Caroline Progress	TidewaterReview.com

The news release was published in at least two local newspapers, the Rappahannock Times and Northern Neck News, and a short article announcing the availability of the draft determination also appeared in the Richmond Times Dispatch. During the public comment period, we received 11 letters and one petition. Nine of the letters, and the 38

signatories to the petition, expressed the opinion that cooperative farming should remain a long-term component of the refuge's habitat management program. Two letters supported restoring refuge lands to native vegetation. For the reasons discussed in the body of this determination, we do not believe that cooperative farming would be compatible over the long term. However, we recognize that there may be some cooperative farming occurring on the refuge beyond the five-year window described. If new lands are acquired, for example, they may be temporarily enrolled in a cooperative farming program while plans are made and implemented to restore them to native habitats.

The refuge manager will provide responses to the 11 individuals who wrote letters commenting on the draft determination, explaining the final decision. A letter to the editor or news release will be used to disseminate information to the public at large in order to reach those who signed the petition.

Determination (check one below):

Use is Not Compatible

 X

Use is Compatible With the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

The cooperative farming program on the Tayloe Tract will be phased out entirely within five years, unless new circumstances arise at which time a new compatibility determination will be required.

The program will adhere to general conditions for cooperative farming programs as listed in the Refuge Manual (6 RM 4 Exhibit 1).

All operations on refuge cropland are to be carried out in accordance with the best farming and soil conservation practices.

The cooperator must have prior approval of the Refuge Manager before the application of any pesticide. The cooperator must supply the Refuge Manager, at least three months prior to farming, a label containing common name, application rate, number, and methods, and target pests. The cooperator, at the time of application, is required to complete a pesticide spray record furnished by the refuge. These records provide the refuge information on trace residues and improve pest control practices.

Justification

The Final Environmental Assessment to establish the Rappahannock River Valley National Wildlife Refuge provides for the use of cooperative farming as a viable resource management opportunity in the management of the refuge. The use of cooperative farming as an interim measure will keep fields open in preparation for conversion to native plants, and will help us to properly establish newly converted early successional habitats.

The refuge cooperative farming program is an integral component of the refuge's overall habitat restoration and management efforts. In lieu of paying rent for the use of refuge farm fields, the cooperator supports the accomplishment of refuge habitat management objectives by performing farming-related services related to our annual habitat management program and activities. Farming-related services include providing native grass and other native seed, planting, plowing, disking, mowing, and applying herbicide.

In accordance with 50 CFR 29.1, cooperative farming, as described in this compatibility determination, significantly contributes to the mission, purposes, goals, and objectives of the Rappahannock River Valley NWR and the National Wildlife Refuge System mission.

Signature: Refuge Manager: Joseph F. McConley 11/15/06
(Signature and Date)

Concurrence: Regional Chief: Anthony J. Sege 12/8/06
(Signature and Date)

Mandatory 10- year Re-evaluation Date: November 15, 2016

Literature Cited

Askins, R.A. 2002. Restoring North America's Birds: Lessons from Landscape Ecology, 2nd Ed. Yale University Press, New Haven and London. 332 pp.

Brown, H. 2000. Wildland Burning by American Indians in Virginia. *Fire Management Today*, 60: 29-39.

Davis, M.B. 1981. Quaternary History and the Stability of Forest Communities. In: *Forest Succession: Concepts and Application*. West, D.C.; Shugart, H.H.; Botkin, D.B., eds. New York, Heidelberg, and Berlin: Springer-Verlag: 132-153.

Day, G.M. 1953. The Indian As a Factor in the Northeastern Forest. *Ecology*, 34(2) 329-346.

Fernandez-Cornejo, Jorge and William D. McBride. 2002. Adoption of Bioengineered Crops. USDA, Agriculture Economic Report No. 810, Washington, D.C.

Gilliam, J.W., D.L. Osmond, and R.O. Evans. 1997. Selected Agricultural Best Management Practices to Control Nitrogen in the Neuse River Basin. North Carolina Agricultural Research Service Technical Bulliten 311, North Carolina State University, Raleigh, NC.

Grumet, Robert S. 2000. Bay, Plain, and Piedmont: A Landscape History of the Chesapeake Heartland from 1.3 Billion Years Ago to 2000. The Chesapeake Bay Heritage Context Project, 183 pp. Annapolis, MD: U.S. Department of Interior, National Park Service.

Ingram, Bruce. 2006. Where the Buffalo Roamed. *Virginia Wildlife*, Volume 67, Number 2, 4-9.

Mitchell, Laura R., Charles R. Smith and Richard A. Malecki. 2000. Ecology of Grassland Breeding Birds in the Northeastern United States – A Literature Review with Recommendations for Management. USGS-BRD, Cornell University, Ithaca, NY.

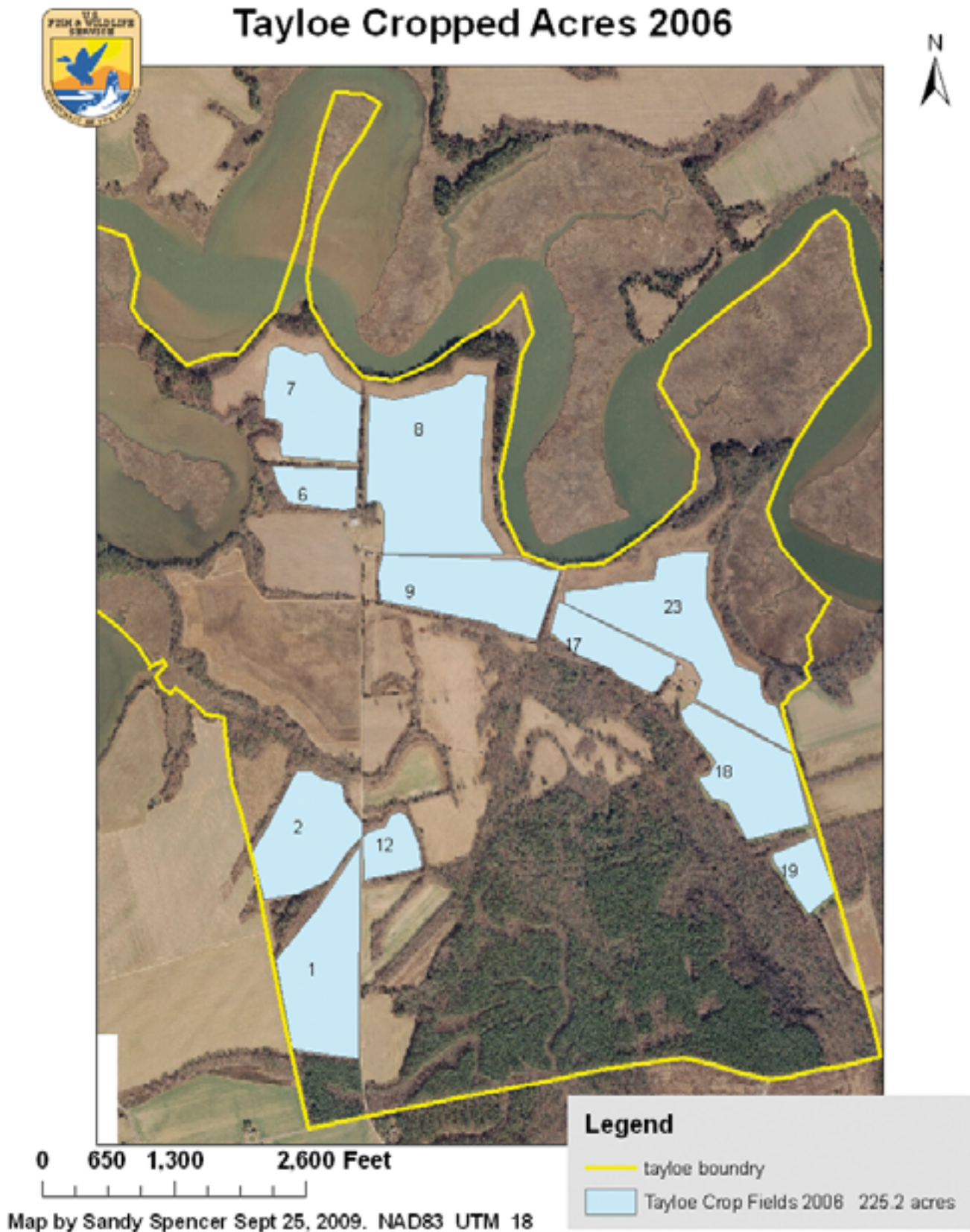
Russel, E.W. B. 1998. Indian-set Fires in the Forest of the Northeastern U.S. *Ecology*, 64(1) 78-88.

USFWS. 1995. Proposal to Establish the Rappahannock River Valley National Wildlife Refuge. Final Environmental Assessment, Hadley, MA.

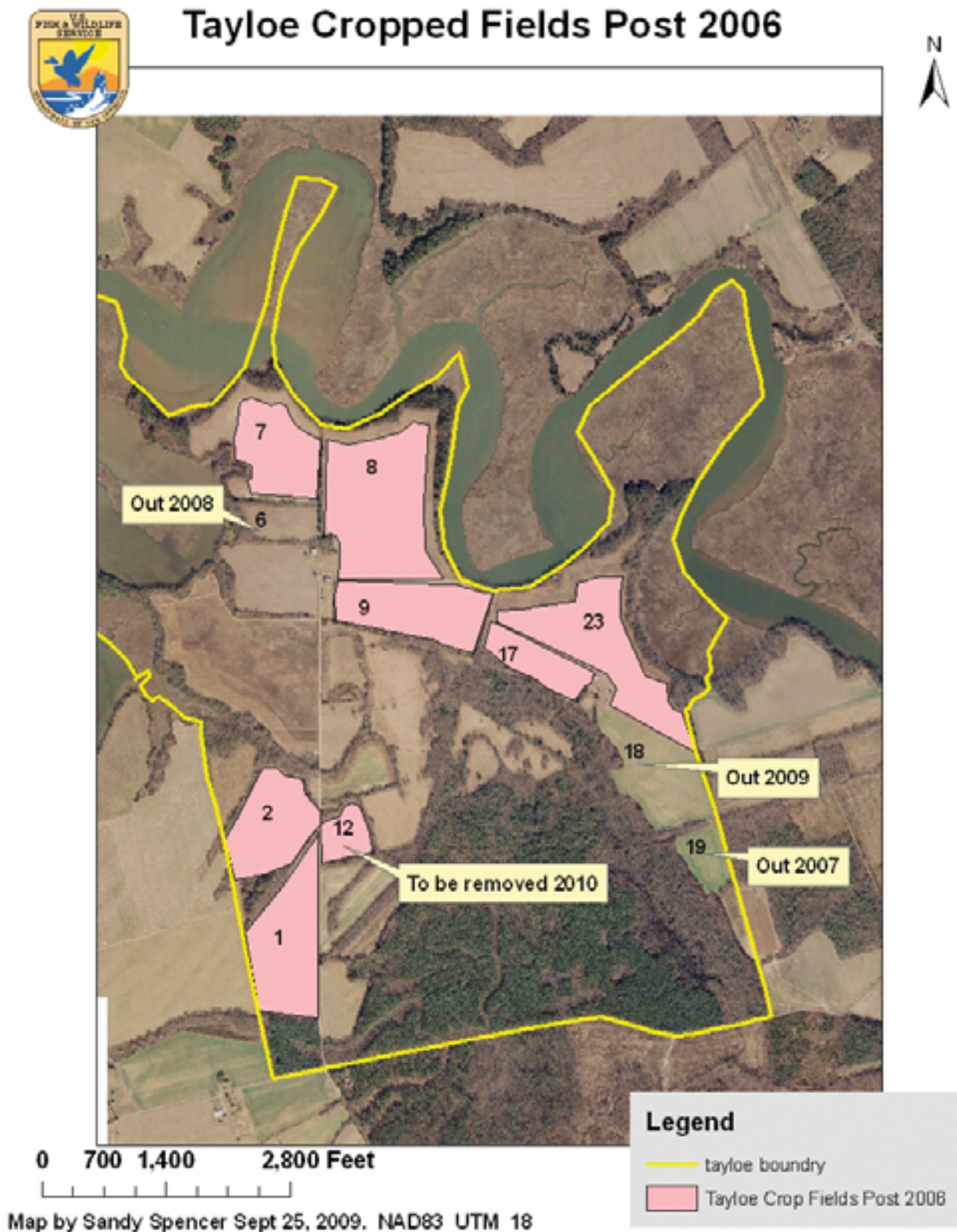
USWFS. 2001. Policy on Biological Integrity, Diversity, and Environmental Health. Fish and Wildlife Manual, 601 FW 3, Washington, D.C.

Watts, Bryan D. 1999, Mid-Atlantic Coastal Plain Bird Conservation Plan, Version 1.0. Center for Conservation Biology, College of William and Mary, Williamsburg, VA.

Map B.9. Tayloe cropped acres 2006



Map B.10. Tayloe cropped fields post 2006



FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Rappahannock River Valley NWRUse: Firewood Cutting

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate Appropriate ✓Refuge Manager: Joseph F. McCauleyDate: Dec 14, 2009

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: Virginia E. RettigDate: December 21, 2009

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Justification for Cutting Firewood as an Appropriate Use
Eastern Virginia Rivers NWR Complex
Rappahannock River Valley NWR

Firewood cutting by the public or refuge staff can benefit the refuge in several ways: cost savings from having to hire contractors, fuel reduction and prevention of wildfires, protection of refuge facilities, and assistance in cleanup from major storms. This use can be accommodated in select locations and during certain periods without causing negative impacts to the diversity or productivity to fish, wildlife or plants. Impacts from this proposal, both short-term and long-term, direct, indirect, and cumulative, are expected to be minor and are not expected to diminish the value of the refuge for its stated objectives. The area affected by the proposed use represents a small fraction of the refuge land area.

COMPATIBILITY DETERMINATION

Project Title: Firewood cutting
Station Name: Rappahannock River Valley National Wildlife Refuge
Date Established: May 28, 1996

Establishing Authorities:

The Emergency Wetlands Resources Act of 1986 (100 Stat. 3582-91) for: "...the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions..." (16 U.S.C. §3901(b); 100 Stat. 3583).

The Endangered Species Act of 1973 (16 U.S.C. §1531-1543), as amended: "...to conserve (A) fish or wildlife which are listed as endangered species or threatened species...or (B) plants..." (16 U.S.C. §1534).

The Land and Water Conservation Fund Act (P.L. 88-578; 16 U.S.C. §4601; 78 Stat. 897) for: "...the acquisition of areas needed for conserving endangered or threatened species of fish, wildlife and plants..." (P.L. 94-422; 90 Stat. 1313).

Purpose for which Established:

The purposes for which the Rappahannock River Valley National Wildlife Refuge was established are:

"...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds ... 16 U.S.C. § 715d (Migratory Bird Conservation Act)," and

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species or (B) plants ... 16 U.S.C. § 1534 (Endangered Species Act of 1973)," and

"... the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ... 16 U.S.C. § 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act of 1986)," and

"...for the development, advancement, management, conservation, and protection of fish and wildlife resources ... 16 U.S.C. § 742f(a)(4) (Fish and Wildlife Act of 1956)."

National Wildlife Refuge System Mission: To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Proposed Use: The following questions and answers provide a concise description of the proposed use.

1. What is the use? Is the use a priority public use? The use is firewood cutting by the public or by refuge staff. It is not one of the priority uses of the Refuge System, however, cutting of downed trees by the public or refuge staff could facilitate priority uses by removing obstacles along trails or public roads, or by removing trees that threaten refuge facilities.

In accordance with 50 CFR 29.1, firewood cutting is an economic use of the refuge, in that firewood is a commodity that is typically bought and sold.

2. Where would the use be conducted? Firewood cutting could potentially occur on any refuge tract acquired in fee. Fire wood collection will be restricted to existing roads, trails, dikes and other facilities. No new roads will be constructed to facilitate this use. Equipment used for the harvesting and collection of firewood will be limited to chainsaws and axes for cutting. Personal pick-up trucks with small utility trailers would generally be used for access and hauling of wood. Other equipment such as farm tractors may be allowed if the refuge manager determines that no resource damage is likely to occur as a result, and if this type of equipment would result in a more efficient or safer operation.

We have no authority to allow this use on tracts where the refuge holds a conservation easement.

3. When would the use be conducted? The use would occur during daylight hours, potentially on any day of the week throughout the year. The use will be limited to times when the ground is dry to prevent rutting and damage to roads or underlying soils and vegetation.

4. How would the use be conducted? We plan to permit firewood cutting for personal use when removing wood from the refuge provides benefits to refuge management, such as after a storm event when trees are blocking refuge roads or if standing trees threaten refuge facilities. We may also allow wood to be taken in situations where doing so would not materially interfere with refuge purposes or prevent us from accomplishing refuge objectives. For example, if an individual tree falls along a common boundary with a refuge neighbor, and the neighbor requests to be allowed to cut the tree for firewood, we may issue a special use permit authorizing this use, if doing so would not have adverse impacts on adjoining habitat.

Pending regional director approval, we may also extend the firewood cutting privilege to refuge staff under the same conditions as those presented to the public at large. In the event of a large storm event, such as Hurricane Isabel, we may have dozens or even hundreds of trees down on the refuge. Allowing refuge staff or the public to remove trees may save the refuge time and funds, especially at times when tree contractors have more work than they can handle.

We would evaluate firewood cutting requests on a case-by-case basis. We would evaluate potential impacts to adjoining habitats (including access lanes), safety, duration, time of year, and any other parameters necessary to protect wildlife, plants, and habitat and to ensure public safety. Prior to allowing this use, a special use permit would be issued describing the parameters of the activity (who, when where, how), and any special conditions that must be followed.

We would likely charge a small fee for firewood cutting, such as \$25 per cord. A cord is roughly two loads in a full size pickup truck. This would help defray administrative costs in issuing and enforcing special use permits. The fee would apply equally to the public or refuge staff. Refuge staff would not be permitted to use refuge equipment or vehicles for firewood cutting or removal if it is for personal use.

5. Why is the use being proposed? This use is being proposed in response to past inquiries from refuge neighbors who have asked for permission to cut and remove trees that have fallen on or near refuge boundaries near their private property. We deferred making any decision on these requests since they came during preparation of the refuge's Comprehensive Conservation Plan and we wanted to evaluate them in light of newly developed refuge goals, objectives, and strategies. It is clear that none of the proposed refuge goals, objectives, or strategies would be materially compromised due to a firewood cutting program that receives further evaluation on a case-by-case basis. The program will significantly enhance our ability to engage, educate and utilize volunteers and other individuals in refuge management activities by permitting and authorizing the collection of firewood for personal use.

We are also cognizant of past instances when having the public or staff remove trees from refuge roads or public use areas would have benefitted the refuge in terms of cost savings or timeliness, such as after Hurricane Isabel.

Tree removal can also reduce fire hazards by reducing fuel loads after timber harvest, storm events, or in areas that are overstocked.

Availability of Resources: We do not anticipate this use requiring significant resources to administer. Refuge staff would have to visit any sites proposed for firewood cutting and evaluate the situation using parameters described above. A special use permit would be issued and monitored. Follow up with permittees may be necessary if all conditions of the permit were not met. We expect that in the majority of instances, these activities would require a minimal amount of time. An estimate of resources required for a single permit is as follows:

Site visit:	1 hour @ \$30/hour*	= \$30.00
Permit preparation:	0.5 hour @ \$18/hour**	= \$ 9.00
Permit compliance:	1 hour @ \$30/hour	= \$30.00
Total:		= \$69.00

Potential income based on 2 cords per permit: @ \$25 = \$50.00

Net estimated resources required per permit: = \$19.00

* \$30/hour based on average of GS-7 (refuge officer), GS-12 (deputy manager) and GS-13 (manager).

** \$18/hour based on GS-7 (administrative assistant).

Anticipated Impacts on Refuge Purpose: As noted on page one of this compatibility determination, there are four purposes for establishment and management of this refuge. In general, they relate to four primary conservation and management responsibilities:

1. Migratory birds,
2. Threatened and endangered plant and animal species,
3. Wetlands, and
4. Other fish and wildlife resources.

Following is a discussion on the anticipated impacts of the proposed uses related to the resources listed within refuge purposes.

Potential impacts to birds: Firewood cutting could adversely impact birds through disturbance due to excessive noise, trampling of nests, loss of nests built in downed trees, removal of cavity trees, and disturbance during ingress and egress.

Since permits will only be issued after a site visit by refuge staff, we can ensure that impacts will be minimized or eliminated. For example, we would not permit removal of dead standing trees unless they threaten refuge facilities. In those instances, we will remove only that portion of the tree that is likely to cause damage and will leave as much of the trunk as possible to serve as future cavities and as feeding areas for insectivorous birds. We will also rely on existing roads and trails for access, reducing the potential loss of habitat from creating new roads or trails. Disturbance due to noise and activity in the immediate vicinity of trees being cut will be temporary and confined to a relatively localized area. We will observe time of year and distance restrictions for bald eagles as outlined in the Virginia bald eagle management guidelines.

Potential impacts to threatened and endangered species: The only federal-threatened species confirmed to exist on the refuge is the sensitive joint-vetch. The sensitive joint-vetch is an annual legume that grows along fresh tidal rivers and streams. Firewood cutting would not occur in proximity to this habitat and therefore would have no impact on this species.

Potential impacts to wetlands: Potential adverse impacts to wetlands could arise if vehicles were permitted to access firewood cutting areas through wetlands or if this or other activities associated

with the program increase erosion into wetlands. Site visits and the accompanying evaluations will prevent these impacts from occurring.

Potential impacts to other fish and wildlife: We expect that potential impacts to other fish and wildlife will be temporary and isolated.

We are including this program in our CCP as a planned activity common to all alternatives so we can accommodate requests and opportunities on a case-by-case basis without having to do a compatibility determination on each instance. In essence we will be doing an evaluation, and assuring compatibility, each time a request is made or we seek to save costs by inviting the public or staff to remove trees that we would otherwise have to have removed via contract. Each time we evaluate a potential firewood cutting operation, we will ensure that impacts to fish, wildlife, and plants, and their habitats, are minimal and do not interfere with refuge objectives. We will make it a condition of the permit that firewood taken from the refuge is for personal use and is not to be re-sold.

In summary, our research, observations and knowledge of the area provide no evidence that firewood cutting as described above, on a case-by-case basis, directly, indirectly, or cumulatively, will have an unacceptable effect on wildlife resources or their habitats.

Public Review and Comment: This determination was made available for a 30-day public review and comment period in conjunction with the release of the Draft Comprehensive Conservation Plan for the refuge.

Determination (check one below):

Use is Not Compatible

 X

Use is Compatible With the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

1. All activities will comply with the Bald Eagle Protection Guidelines for Virginia, jointly developed by the U.S. Fish and Wildlife Service and the Virginia Department of Game and Inland Fisheries, in consultation with the Center for Conservation Biology.
2. Each special use permit issued for firewood cutting will be evaluated on a case-by-case basis to ensure that there will be only minor and temporary adverse impacts to wildlife and habitat.
3. Uses will be monitored as needed to ensure that the program contributes to, or does not detract from, refuge objectives.

Justification: Firewood cutting by the public or refuge staff can benefit the refuge in several ways: cost savings from having to hire contractors, fuel reduction and prevention of wildfires, protection of refuge facilities, and assistance in cleanup from major storms. This use can be accommodated in select locations and during certain periods without causing negative impacts to the diversity or productivity to fish, wildlife or plants. Impacts from this proposal, both short-term and long-term, direct, indirect, and cumulative, are expected to be minor and are not expected to diminish the value of the refuge for its stated objectives. The area affected by the proposed use represents a small fraction of the refuge land area.

In accordance with 50 CFR 29.1, firewood cutting, as described in this compatibility determination, significantly contributes to the mission, purposes, goals, and objectives of the Rappahannock River Valley NWR and the National Wildlife Refuge System mission.

Signature: Refuge Manager: Joseph F. McCauley 12/14/09
(Signature and Date)

Concurrence: Regional Chief: Anthony D. Leger 12/21/2009
(Signature and Date)

Mandatory 10-year Re-evaluation Date: DECEMBER 21, 2019

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Rappahannock River Valley NWRUse: Research

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(d) Is the use consistent with public safety?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(g) Is the use manageable within available budget and staff?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(h) Will this be manageable in the future within existing resources?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 503 FW 1, for description), compatible, wildlife-dependent recreation into the future?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ☐ No ☒

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ☐Appropriate ☒Refuge Manager: Joseph F. McCauleyDate: December 7, 2006

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: John P. StarkDate: 1/10/07

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Eastern Virginia Rivers NWR Complex
Rappahannock River Valley NWR

Justification for Research as an Appropriate Use

Prior to allowing any use of the refuge, the refuge manager must first determine if the use is appropriate, and if so, he or she must then complete a compatibility determination. The six priority wildlife dependent recreational uses (environmental education, fishing, hunting, interpretation, wildlife observation and wildlife photography) are considered by policy to be appropriate. Therefore, only general public uses or specialized uses must be evaluated for their appropriateness.

We have evaluated **research** and the refuge manager has determined that this use is appropriate.

Rappahannock River Valley National Wildlife Refuge was established

“...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds ... 16 U.S.C. § 715d (Migratory Bird Conservation Act,” and

“... to conserve (A) fish or wildlife which are listed as endangered species or threatened species or (B) plants ... 16 U.S.C. § 1534 (Endangered Species Act of 1973),” and

“... the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ... 16 U.S.C. § 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act of 1986),” and

“for the development, advancement, management, conservation, and protection of fish and wildlife resources ... 16 U.S.C. § 742f(a)(4) (Fish and Wildlife Act of 1956).

The refuge manager has determined that research meets all ten criteria for a use of the refuge to be considered appropriate. A brief explanation follows:

Research conducted by non-Service personnel, including colleges, universities, federal, state, and local agencies, non-governmental organizations, and qualified members of the public can further our understanding of the natural environment and improve the management of refuge natural resources. Much of the information research generates applies to management on and near the refuge.

The Service encourages and supports research and management studies on refuge lands that will improve and strengthen decisions on managing natural resources. The refuge manager will encourage research that clearly relates to approved refuge objectives, improves habitat management, and promotes adaptive management. Research can provide information to better manage the Nation's biological resources that can be used by other units of the National Wildlife Refuge System, other Federal agencies, and State Fish and Game agencies. Research may address important management issues, or identify and refine techniques for managing species or habitats.

We will also consider permitting research for other purposes that may not relate directly to refuge-specific objectives, but contribute to the broader enhancement, protection, use, preservation or management of native populations of fish, wildlife and plants, and their natural diversity in the region or the Atlantic flyway. All proposals must comply with Service policy on compatibility, and generally require issuance of a special use permit.

COMPATIBILITY DETERMINATION

Project Title: Research

Station Name: Rappahannock River Valley National Wildlife Refuge

Date Established: May 28, 1996

Establishing Authorities:

The Emergency Wetlands Resources Act of 1986 (100 Stat. 3582-91) for: "...the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions..." (16 U.S.C. §3901(b); 100 Stat. 3583).

The Endangered Species Act of 1973 (16 U.S.C. §1531-1543), as amended: "...to conserve (A) fish or wildlife which are listed as endangered species or threatened species...or (B) plants..." (16 U.S.C. §1534).

The Land and Water Conservation Fund Act (P.L. 88-578; 16 U.S.C. §4601; 78 Stat. 897) for: "...the acquisition of areas needed for conserving endangered or threatened species of fish, wildlife and plants..." (P.L. 94-422; 90 Stat. 1313).

Purpose for which Established:

The purposes for which the Rappahannock River Valley National Wildlife Refuge was established are:

"...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds ... 16 U.S.C. § 715d (Migratory Bird Conservation Act)," and

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species or (B) plants ... 16 U.S.C. § 1534 (Endangered Species Act of 1973)," and

"... the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ... 16 U.S.C. § 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act of 1986)," and

"for the development, advancement, management, conservation, and protection of fish and wildlife resources ... 16 U.S.C. § 742f(a)(4) (Fish and Wildlife Act of 1956)."

National Wildlife Refuge System Mission: To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Proposed Use: The following questions and answers provide a concise description of the proposed use.

1. What is the use? Is the use a priority public use? The use is research or other ecological investigations not conducted by the Service or a Service-authorized agent. Research is not a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997.

2. Where would the use be conducted? Research could be conducted throughout the refuge, depending on the subject. Any refuge tract could potentially be available for research activities. Specific areas open for research will be stipulated in conditions of a special use permit, including access points.

3. When would the use be conducted? As with locations, the timing of research will be dependent on the type and subject(s) of the research project. Research could potentially occur throughout the year. Time of year restrictions could be imposed to protect threatened or endangered species or to prevent conflicts with other refuge uses or management activities.

4. How would the use be conducted? The mechanics of the research will depend entirely on the individual research project. We will carefully scrutinize the objectives, methods, and approach of each research project before allowing it on the refuge. We will not allow any research project that lacks an approved study plan and protocol or compromises public health and safety. We will route draft proposals through the Regional Research Coordinator and Regional Biologist for review to ensure that protocols meet Service standards.

5. Why is the use being proposed?

Research by non-Service personnel is conducted by colleges, universities, federal, state, and local agencies, non-governmental organizations, and qualified members of the public furthers our understanding of the natural environment and improves the management of refuge natural resources. Much of the information research generates applies to management on and near the refuge.

The Service encourages and supports research and management studies on refuge lands that will improve and strengthen decisions on managing natural resources. The refuge manager encourages and seeks research that clearly relates to approved refuge objectives, improves habitat management, and promotes adaptive management. Priority research addresses information on better managing the Nation's biological resources that generally are important to agencies of the Department of Interior, the National Wildlife Refuge System, and State Fish and Game Agencies, that address important management issues, or demonstrate techniques for managing species or habitats.

We also consider research for other purposes that may not relate directly to refuge-specific objectives, but contribute to the broader enhancement, protection, use, preservation or management of native populations of fish, wildlife and plants, and their natural diversity in the region or the Atlantic flyway. All proposals must comply with Service policy on compatibility.

Both the Refuge Manual and the Service Manual provide guidance on allowing research on refuges. The Refuge Manual (4 RM 6.2) lists three objectives that can be met by permitting research on refuges:

- 1) To promote new information which will improve the quality of refuge and other Service management decisions,
- 2) To expand the body of scientific knowledge about fish and wildlife, their habitats, the use of these resources, appropriate resource management, and the environment in general, and
- 3) To provide the opportunity for students and others to learn the principles of field research.

The Service Manual (603 FW 1.10D(4)) provides supplemental guidance in terms of the appropriateness of research on refuges, as follows: “We actively encourage cooperative natural and cultural research activities that address our management needs. We also encourage research related to the management of priority general public uses. Such research activities are generally appropriate. However, we must review all research activities to decide if they are appropriate or not as defined in section 1.11. Research that directly benefits refuge management has priority over other research.”

The Refuge Manager determined that research is an appropriate use of the refuge in a document signed on December 7, 2006. We will follow the above-referenced guidance in seeking and approving any research activities on the refuge.

There are two examples of research completed on the refuge that serve to illustrate the kind of research that may occur in the future. Both of these projects were conducted by Service personnel or Service-authorized agents, and therefore were classified as management activities not subject to compatibility review. However, they are excellent examples of the type of research we would consider to be appropriate and compatible.

Winter Grassland Bird Study – Few investigations have been completed on methodologies for inventorying obligate grassland birds on their wintering ranges. After consulting the literature and expert ornithologists, the refuge and regional biologists crafted a study to examine three different methods, their relative costs, and their statistical robustness. The results gave the refuge information on species using the refuge in winter months, the kinds of structural habitats they were using, and provided information on methods that could be used by other refuges seeking similar information.

Effects of Salinity and Nitrogen on the Distribution and Growth of *Phragmites australis* Along the Rappahannock River – The refuge has promoted and sponsored an aggressive control program for common reed (*Phragmites*) on both public and private lands along the Rappahannock River for several years. This study examined both native and introduced genotypes of *Phragmites* and the effects of salinity and nitrogen on growth and distribution. The

results not only added new information to the scant body of literature regarding native *Phragmites*, but gave the refuge specific locations of native stands, and potential locations based on salinity regimes, in order to better protect this subspecies during control operations.

Availability of Resources: Refuge support for research may take the form of funding, in-kind services such as housing, the use of other refuge facilities, vehicles, boats, or equipment, the direct assistance of refuge staff in collecting data, providing historical records, conducting management treatments, or providing other assistance as appropriate. Generally, however, we incur the bulk of the cost for research in staff time to review research proposals, coordinate with researchers, and write special use permits (SUPS). In some cases, a research project may require only a few hours of staff time to review the proposal, coordinate with other reviewers, and write a SUP. In other cases, a research project may involve more significant staff time, because the refuge staff must coordinate with students and advisors and accompany researchers on site visits.

For projects conducted entirely by non-Service researchers, the following staff resources would be typical:

Proposal review, coordination, and SUP preparation –	Refuge Manager, 2 hours	\$112
	Deputy Manager, 2 hours	\$ 90
	Refuge Biologist, 8 hours	\$283
Total		\$485

For the refuge to expend significantly more than this level of resources, the research would generally be required to have specific implications to our management. If the research was aimed at answering refuge-specific management questions, we would consider contributing additional resources. In this case, we might expect to contribute the following:

Proposal review, coordination, and SUP preparation –	Refuge Manager, 8 hours	\$ 448
	Deputy Manager, 8 hours	\$ 362
	Refuge Biologist, 16 hours	\$ 566
Field assistance	Refuge Biologist, 160 hours	\$5,659
	Maint. Worker, 40 hours	\$ 961
Use of Facilities and Equipment		
Trailer as quarters	30 days @ \$12/day	\$ 360
Vehicle or boat	30 days @\$20/day	\$ 600
Total		\$8,956

Anticipated Impacts on Refuge Purpose: We are scheduled to complete our Comprehensive Conservation Plan in 2007. In the interim, we are using the broad objectives set forth in the Environmental Assessment prepared during the establishment of the Refuge in 1995. They are as follows:

- (1) To preserve and enhance the refuge's land and water in a manner that will conserve the natural diversity of fish, wildlife, plants and their habitats for present and future generations;
- (2) To protect, restore and enhance ecologically significant wetland habitats;
- (3) To conserve and enhance populations of fish, wildlife, and plants within refuge boundaries; to manage and perpetuate the migratory bird resource including populations of waterfowl, neotropical migrants, raptors, passerines, and marsh and water birds;
- (4) To protect, restore and enhance interjurisdictional fish populations;
- (5) To protect and enhance endangered and threatened species populations;
- (6) To protect and enhance water quality of aquatic habitats with the refuge and the River;
- (7) To fulfill international treaty obligations of the United States with respect to fish and wildlife and their habitats, and
- (8) To provide opportunities for compatible scientific research, environmental education, and fish and wildlife-oriented recreation.

In terms of the impacts related specifically to interim objectives of the Refuge, we expect no negative long-term impact to the **wildlife or plant diversity, wetlands, migratory birds, interjurisdictional fish, threatened and endangered species, water quality, treaty obligations, or wildlife -dependent recreation.**

Ideally, any research project conducted on the refuge would positively contribute to one or more of our interim objectives. There may be short-term disturbance to plants and wildlife during field investigations, but this is unavoidable in most cases. We will conduct Intra-Service Section 7 Biological Evaluations for any proposal that could be anticipated to have an impact on any federally threatened or endangered species. We will pay particular attention to the joint Service-State Bald Eagle Protection Guidelines for Virginia. These guidelines provide distance and time-of-year restrictions for activities that could disturb nesting or roosting eagles. We will ensure that the refuge or any non-Service researchers obtain any special permits, including collection and banding permits, required by State or Federal law prior to issuing a SUP.

Public Review and Comment: A Draft Compatibility Determination was released for public review from January 18 through February 9, 2007. A news release announcing the availability of the draft determination was issued to the following media outlets:

Rappahannock Times
Northern Neck News
Southside Sentinel
Northumberland Echo

Westmoreland News
Free Lance-Star
Rappahannock Record
Caroline Progress

Richmond Times Dispatch
The Journal
Daily Press
WRAR

WNNT
WKWI
NorthernNeckToday.com
TidewaterReview.com

During the public review period, we received one comment from a researcher from Virginia Commonwealth University who made suggestions on improving our requirements for captive animal handling and suggested limiting the number of pages for research study proposals. Both suggestions were incorporated into the final determination. We received no other comments.

Determination (check one below):

_____ **Use is Not Compatible**

 X **Use is Compatible With the Following Stipulations**

Stipulations Necessary to Ensure Compatibility:

We will require all researchers to submit a detailed research proposal that follows Rappahannock River Valley National Wildlife Refuge study proposal guidelines (see attachment I) and Service Policy (Refuge Manual 4 RM 6). Researchers must give us at least 45 days to review proposals before the research begins. If the research involves the collection of wildlife, the refuge must be given 60 days to review the proposal. Researchers must obtain all necessary scientific collecting or other permits before starting the research. We will prioritize and approve proposals based on the need, benefit, compatibility, and funding required for the research.

We require researchers to submit a final report to the refuge on completing their work. For long-term studies, we may also require interim progress reports. We also expect that research will be published in peer-reviewed publications. All reports, presentations, posters, articles or other publications will acknowledge the Refuge System and Rappahannock River Valley Refuge as partners in the research.

We will issue SUPs for all research conducted by non-Service personnel. The SUP will list all conditions necessary to ensure compatibility. The SUPs will also identify a schedule for annual progress reports and the submittal of a final report or scientific paper.

We may ask our regional refuge biologists, other Service divisions, state agencies, or academic experts to review and comment on proposals. We will require all researchers to obtain appropriate state and federal permits.

Justification

The Service encourages research on national wildlife refuges to promote new information which will improve the quality of refuge and other Service management decisions, to expand the body of scientific knowledge about fish and wildlife, their habitats, the use of these resources, appropriate resource management, and the environment in general, and to provide the opportunity for students and others to learn the principles of field research.

In accordance with 50 CFR 26.41, research conducted by non-Service personnel, as described in this compatibility determination, will not materially interfere with, or detract from, the fulfillment of the National Wildlife Refuge System mission or the purposes for which the refuge was established.

Signature: Refuge Manager: Joseph F. McAuley 2/22/07
(Signature and Date)

Concurrence: Regional Chief: Anthony D. Leger 03/23/2007
(Signature and Date)

Mandatory 10- year Re-evaluation Date: March 23, 2017

Literature Cited

USFWS. 1982. Research and Management Studies. Refuge Manual, 6 RM 4, Washington D.C.

USFWS. 2006. Policy on Appropriate Refuge Uses. Fish and Wildlife Service Manual, 601 FW 3, Washington, D.C.

Attachment I. Rappahannock River Valley National Wildlife Refuge Study Proposal Guidelines¹

A study proposal is a justification and description of the work to be done, and includes cost and time requirements. The proposals must be specific enough to serve as blueprints for the investigation. They must spell out in advance systematic plans for the investigation at a level of detail commensurate with the cost and scope of the project and the needs of management. Please submit proposals electronically as a Microsoft® Word® document or hard copy to the refuge manager. Please limit submissions to 20 one-sided, or 10 double-sided pages.

The following list provides a general outline of first-order headings/sections for study proposals.

- Cover Page
- Table of Contents (for longer proposals)
- Abstract
- Statement of Issue
- Literature Summary
- Objectives/Hypotheses
- Study Area
- Methods and Procedures
- Quality Assurance/Quality Control
- Specimen Collections
- Deliverables
- Special Requirements, Concerns, Necessary Permits
- Literature Cited
- Peer Review
- Budget
- Personnel and Qualifications

Cover Page

The cover page must contain the following information.

- Title of Proposal
- Current Date
- Investigator's(s')—name, title, organizational affiliation, address, telephone and fax numbers and e-mail address of all investigators or cooperators.
- Proposed Starting Date
- Estimated Completion Date
- Total Funding Support Requested from the U.S. Fish and Wildlife Service if applicable
- Signatures of Principal Investigator(s) and other appropriate institutional officials

¹ Adapted from Lake Umbagog NWR Study Proposal Guidelines

Abstract

The abstract should contain a short summary description of the proposed study, including reference to major points in the sections “Statement of Issue,” “Objectives,” and “Methods and Procedures.”

Statement of Issue

Provide a clear precise summary of the problem to be addressed and the need for its solution. This section should include statements of the importance, justification, relevance, timeliness, generality, and contribution of the study. Describe how any products will be used, including any anticipated commercial use. What is the estimated probability of success of accomplishing the objective(s) within the proposed timeframe?

Literature Summary

This section should include a thorough but concise literature review of current and past research that pertains to the proposed research, especially any pertinent research conducted on national wildlife refuges. A discussion of relevant legislation, policies, and refuge planning and management history, goals, and objectives should also be included if applicable.

Objectives/Hypotheses

A very specific indication of the proposed outcomes of the project should be stated as objectives or hypotheses to be tested. Project objectives should be measurable. Provide a brief summary of what information will be provided at the end of the study and how it will be used in relation to the problem. These statements should flow logically from the statement of issue and directly address the management problem.

Establish data quality objectives in terms of precision, accuracy, completeness, and comparability as a means of describing how good the data need to be to meet the project’s objectives.

Study Area

Provide a detailed description of the geographic area(s) to be studied and include a clear map delineating the proposed study area(s) and showing specific locations where work will occur.

Methods and Procedures

This section should describe as precisely as possible, how the objectives will be met or how the hypotheses will be tested. Include detailed descriptions and justifications of the field and laboratory methodology, protocols, and instrumentation. Explain how each variable to be measured directly addresses the research objective/ hypothesis. Describe

the experimental design, population, sample size, and sampling approach (including procedures for sub-sampling). Summarize the statistical and other data analysis procedures to be used. List the response variables and tentative independent variables or covariates. Describe the experimental unit(s) for statistical analysis. Also include a detailed project time schedule that includes start, fieldwork, analysis, reporting, and completion dates.

Quality Assurance/Quality Control

Adequate quality assurance/quality control (QA/QC) procedures help insure that data and results are credible and not an artifact of sampling or recording errors; of known quality; able to stand up to external scientific scrutiny; and accompanied by detailed method documentation. Describe the procedures to be used to insure that data meet defined standards of quality and program requirements, errors are controlled in the field, laboratory, and office, and data are properly handled, documented, and archived. Describe the various steps (e.g. personnel training, calibration of equipment, data verification and validation) that will be used to identify and eliminate errors introduced during data collection (including observer bias), handling, and computer entry. Identify the percentage of data that will be checked at each step.

Specimen Collections

Clearly describe the kind (species), numbers, sizes, and locations of animals, plants, rocks, minerals, or other natural objects to be sampled, captured, or collected. Identify the reasons for collecting, the intended use of all the specimens to be collected, and the proposed disposition of collected specimens. For those specimens to be retained permanently as voucher specimens, identify the parties responsible for cataloging, preservation, and storage and the proposed repository.

Deliverables

The proposal must indicate the number and specific format of hard and/or electronic media copies to be submitted for each deliverable. The number and format will reflect the needs of the refuge and the refuge manager. Indicate how many months after the project is initiated (or the actual anticipated date) that each deliverable will be submitted. Deliverables are to be submitted or presented to the refuge manager.

Deliverables that are required are as follows.

Reports and Publications

Describe what reports will be prepared and the timing of reports. Types of reports required in fulfillment of natural and social science study contracts or agreements include:

- 1). Progress report(s) (usually quarterly, semiannually, or annually): (may be required)
- 2). Draft final and final report(s): (always required).

A final report must be submitted in addition to a thesis or dissertation (if applicable) and all other identified deliverables. Final and draft final reports should follow refuge guidelines (attachment I).

In addition, investigators are encouraged to publish the findings of their investigations in refereed professional, scientific publications and present findings at conferences and symposia. Investigator publications will adhere to Service design standards. The refuge manager appreciates opportunities to review manuscripts in advance of their publication.

Data Files

Provide descriptions of any spatial (GIS) and non-spatial data files that will be generated and submitted as part of the research. Non-spatial data must be entered onto Windows CD-ROMs in Access or Excel. Spatial data, which includes GPS-generated files, must be in a format compatible with the refuge's GIS system (ArcGIS 8 or 9, Arcview 3.3, or e00 format). All GIS data must be in UTM 18, NAD 83. A condition of the permit will be that the Service has access to and may utilize all GIS information generated.

Metadata

For all non-spatial and spatial data sets or information products, documentation of information (metadata) describing the extent of data coverage and scale, the history of where, when, and why the data were collected, who collected the data, the methods used to collect, process, or modify/ transform the data, and a complete data dictionary must also be provided as final deliverables. Spatial metadata must conform to U.S. Fish and Wildlife Service (FGDC) metadata standards.

Oral Presentations

Three types of oral briefings should be included: pre-study, annual, and closeout. These briefings will be presented to refuge staff and other appropriate individuals and cooperators. In addition, investigators should conduct periodic informal briefings with refuge staff throughout the study whenever an opportunity arises. During each refuge visit, researchers should provide verbal updates on project progress. Frequent dialogue between researchers and refuge staff is an essential element of a successful research project.

Specimens and Associated Project Documentation

A report on collection activities, specimen disposition, and the data derived from collections, must be submitted to the refuge following refuge guidelines.

Other:

Researchers must provide the refuge manager with all of the following.

- 1) Copies of field notes/ notebooks/ datasheets
- 2) Copies of raw data (in digital format), including GIS data, as well as analyzed data
- 3) Copies of all photos, slides (digital photos preferred), videos, films
- 4) Copies of any reports, theses, dissertations, publications or other material (such as news articles) resulting from studies conducted on refuge.
- 5) Detailed protocols used in study
- 6) Aerial photographs
- 7) Maps/GIS
- 8) Interpretive brochures and exhibits
- 9) Training sessions (where appropriate)
- 10) Survey forms
- 11) Value-added software, software developed, models

Additional deliverables may be required of specific studies.

Special Requirements, Permits, and Concerns

Provide information on the following topics where applicable. Attach copies of any supporting documentation that will facilitate processing of your application.

Refuge Assistance

Describe any refuge assistance needed to complete the proposed study, such as use of equipment or facilities or assistance from refuge staff. It is important that all equipment, facilities, services, and logistical assistance expected to be provided by the Fish and Wildlife Service be specifically identified in this section so all parties are in clear agreement before the study begins.

Ground Disturbance

Describe the type, location, area, depth, number, and distribution of expected ground-disturbing activities, such as soil pits, cores, or stakes. Describe plans for site restoration of significantly affected areas.

Proposals that entail ground disturbance may require an archeological survey and special clearance prior to approval of the study. You can help reduce the extra time that may be required to process such a proposal by including identification of each ground disturbance area on a USGS 7.5-minute topographic map.

Site Marking and/or Animal Marking

Identify the type, amount, color, size, and placement of any flagging, tags, or other markers needed for site or individual resource (e.g. trees) identification and location. Identify the length of time it is needed and who will be responsible for removing it.

Identify the type, color, placement of any tags placed on animals (see special use permit for stipulations on marking and handling of animals)

Access to Study Sites

Describe the proposed method and frequency of travel to and within the study site(s). Explain any need to enter restricted areas. Describe the duration, location, and number of participants, and approximate dates of site visits.

Use of Mechanized and Other Equipment

Describe any vehicles, boats, field equipment, markers, or supply caches by type, number, and location. You should explain the need to use these materials and if or how long they are to be left in the field.

Safety

Describe any known potentially hazardous activities, such as electro-fishing, scuba diving, whitewater boating, aircraft use, wilderness travel, wildlife capture or handling, wildlife or immobilization.

Chemical Use

Identify chemicals and hazardous materials that you propose using within the refuge. Indicate the purpose, method of application, and amount to be used. Describe plans for storage, transfer, and disposal of these materials and describe steps to remediate accidental releases into the environment. Attach copies of Material Safety Data Sheets. Pesticide Use Proposals (PUP) may be required. If so, the cooperator must provide all required information to the Deputy Refuge Manager in order to prepare the PUP.

Animal Welfare

If the study involves vertebrate animals, you must follow protocols mandated by the Health Research Extension Act of 1985. It is recommended that you submit a copy of your proposal to the Institutional Animal Care and Use Committee for approval and submit a copy of the IACUC approval letter with your study proposal, or submit a copy of your protocols showing that you are following IACUC requirements. If your IACUC application is in process, you may submit your study proposal in advance of IACUC approval, but you must have approval prior to starting the project. Include qualifications of personnel relevant to animal handling and care. Describe alternatives considered, and outline procedures to be used to alleviate pain or distress. Include contingency plans to be implemented in the event of accidental injury to or death of the animal. Include state and federal permits. Where appropriate, coordinate with and inform state natural resource agencies.

Literature Cited

List all reports and publications cited in the proposal.

Peer Review

Provide the names, titles, addresses, and telephone numbers of individuals with subject-area expertise who have reviewed the research proposal. If the reviewers are associated with the investigator's research institution or if the proposal was not reviewed, please provide the names, titles, addresses, and telephone numbers of 3 to 5 potential subject-area reviewers who are not associated with the investigator's institution. These individuals will be asked to provide reviews of the proposal, progress reports, and the draft final report.

Budget

The budget must reflect both funding and assistance that will be requested from the U.S. Fish and Wildlife Service and the cooperator's contributions on an identified periodic (usually annual) basis. If Service funds are requested, the following budget items must be itemized:

Personnel Costs

Identify salary charges for principal investigator(s), research assistant(s), technician(s), clerical support, and others. Indicate period of involvement (hours analysis and report writing and editing).

Fringe Benefits

Itemize fringe benefit rates and costs.

Travel

Provide separate estimates for fieldwork and meetings. Indicate number of trips, destinations, estimated miles of travel, mileage rate, air fares, days on travel, and daily lodging and meals charges. Vehicle mileage rate cannot exceed standard government mileage rates if federal funds are to be used. Charges for lodging and meals are not to exceed the maximum daily rates set for the locality by the Federal Government (contact the refuge for current rates).

Equipment

Itemize all equipment to be purchased or rented and provide a brief justification for each item costing more than \$1,000. Be sure to include any computer-related costs. For proposals funded under US Fish and Wildlife Service agreement or contract, the refuge reserves the right to transfer the title of purchased equipment

with unit cost of \$1,000 or more to the Federal Government following completion of the study. These items should be included as deliverables.

Supplies and Materials

Purchases and rentals under \$1,000 should be itemized as much as is reasonable.

Subcontract or Consultant Charges

All such work must be supported by a subcontractor's proposal also in accordance with these guidelines.

Specimen Collections

Identify funding requirements for the cataloging, preservation, storage, and analyses of any collected specimens that will be permanently retained.

Printing and Copying

Include costs for preparing and printing the required number of copies of progress reports, the draft final report, and the final report. In general, a minimum of two (2) copies of progress reports (usually due quarterly, semiannually, or as specified in agreement), the draft final report, and the final report are required.

Indirect Charges

Identify the indirect cost (overhead) rate and charges and the budget items to which the rate is applicable.

Cooperator's Contributions

Show any contributing share of direct or indirect costs, facilities, and equipment by the cooperating research institution.

Outside Funding

List any outside funding sources and amounts.

Personnel and Qualifications

List the personnel who will work on the project and indicate their qualifications, experience, and pertinent publications. Identify the responsibilities of each individual and the amount of time each will devote. A full vita or resume for each principal investigator and any consultants should be included here.

Interim and Final Report Guidelines

Draft final and final reports should follow Journal of Wildlife Management format, and should include the following sections.

- Title Page
- Abstract
- Introduction/ Problem statement
- Study Area
- Methods (including statistical analyses)
- Results
- Discussion
- Management Implications
- Management Recommendations
- Literature Cited

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Rappahannock River Valley NWRUse: Retrieval of Hunting Dogs

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate Appropriate ✓Refuge Manager: Joseph F. McCauleyDate: 11/14/07

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: Sten ZunderburgDate: 11/19/07

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Justification for Hunting Dog Retrieval as an Appropriate Use
Eastern Virginia Rivers NWR Complex
Rappahannock River Valley NWR

Rappahannock River Valley National Wildlife Refuge was established

"...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds ... 16 U.S.C. § 715d (Migratory Bird Conservation Act)," and

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species or (B) plants ... 16 U.S.C. § 1534 (Endangered Species Act of 1973)," and

"... the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ... 16 U.S.C. § 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act of 1986)," and

"for the development, advancement, management, conservation, and protection of fish and wildlife resources ... 16 U.S.C. § 742f(a)(4) (Fish and Wildlife Act of 1956).

The purpose of this use is to allow dog owners and handlers to retrieve hunting dogs when they have accidentally entered the Rappahannock River Valley National Wildlife Refuge during general firearms hunting season for deer. We would issue a special use permit, which would also allow the temporary presence of accidentally introduced hunting dogs on the refuge while they are being retrieved.

Hunting deer with pursuit dogs is a traditional and legal method in the counties of the Northern Neck and Middle Peninsula. However, Refuge System regulations prohibit domestic animals, including dogs, to roam at large on any national wildlife refuge. State regulations that allow retrieval of hunting dogs from private land do not apply to refuge lands. We recognize that to strictly enforce Federal regulations would essentially eliminate this traditional method of hunting from lands in close proximity to refuge lands. Therefore we have instituted this permit to allow hunting dogs, hunting dog owners, and those acting on behalf of hunting dog owners, to legally enter the refuge and retrieve their dogs during hunting season when dogs frequently enter the refuge accidentally from adjoining private lands. The permit is based on several assumptions, as described below:

We have had many conversations with dog owners over the past several years in an attempt to develop a mutually-acceptable solution to this issue. We acknowledge that the problem of dogs running at large on the refuge outside of the hunting season has decreased significantly due to cooperation from dog owners. We understand that the refuge attracts dogs released on adjoining lands due to the presence of game animals. We believe that dog owners in general want to retrieve their dogs from refuge lands because if game animals being pursued stay on refuge lands, they are unavailable for harvest by hunters on private lands. However, we recognize that by instituting this permit system, we are opening up the potential for its abuse. For example:

Since many refuge properties are open for deer hunting, dog owners and/or fellow hunt club members could apply for a refuge hunting permit and release dogs on adjoining private lands with the expectation that the dogs would run deer in their direction. This would essentially be the same as hunting with dogs on the refuge, which is prohibited. If we document this activity, the permit may be revoked and violation notices may be issued to the individuals involved.

Similarly, dog owners may release their dogs immediately adjacent to refuge lands with the expectation that the dogs will pursue game through refuge lands to hunters waiting on or near the refuge boundary on the opposite side of the tract. This type of activity shows the intentional release of dogs near or around the refuge and again, if this activity is documented, the permit may be revoked and violation notices may be issued.

There are certain dates when dogs on the refuge during the permitted period are more problematic. These include the refuge muzzleloader hunt dates, dates of wildlife surveys such as the annual Christmas Bird Count, and special public events. The Christmas Bird Count is held each year on the first or second Saturday before Christmas. At the time the permit is prepared and signed, or at least within 30 days of the events, we will inform permit holders of these dates and ask that they take special care not to allow their dogs to enter the refuge. Retrieval permits will not be valid on those dates.

This permit is the only method the refuge has to allow free-roaming dogs to be on the refuge legally, and for them to be legally retrieved. Persons whose dogs may roam on the refuge will be afforded the opportunity to sign and hold an annual permit. Dog owners whose animals are found on the refuge and who have refused to sign a permit, are subject to prosecution.

Dogs that are found roaming at large on the refuge outside of the permitted dates (as specified on the permit or on special occasions where dog owners are notified within 30 days as outlined above), will constitute a violation of federal law title 50 CFR 26.21(b), and the owner of such dogs may have their permit revoked, and or may be issued a federal violation notice with a fine (at time of writing) of not less than \$95 for each dog.

We expect to continue to work cooperatively with dog owners and other hunters to refine and adjust the permit conditions as is necessary to protect refuge visitors, protect wildlife, provide refuge hunters with a quality hunting experience, and promote the traditions of hunting that have existed for generations on the Northern Neck and Middle Peninsula. We therefore have determined that retrieval of dogs during the State firearms hunting season for white-tailed deer is an appropriate use of the refuge.

COMPATIBILITY DETERMINATION

Project Title: Retrieval of Hunting Dogs
Station Name: Rappahannock River Valley National Wildlife Refuge
Date Established: May 28, 1996

Establishing Authorities:

The Emergency Wetlands Resources Act of 1986 (100 Stat. 3582-91) for: "...the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions..." (16 U.S.C. §3901(b); 100 Stat. 3583).

The Endangered Species Act of 1973 (16 U.S.C. §1531-1543), as amended: "...to conserve (A) fish or wildlife which are listed as endangered species or threatened species...or (B) plants..." (16 U.S.C. §1534).

The Land and Water Conservation Fund Act (P.L. 88-578; 16 U.S.C. §4601; 78 Stat. 897) for: "...the acquisition of areas needed for conserving endangered or threatened species of fish, wildlife and plants..." (P.L. 94-422; 90 Stat. 1313).

Purpose for which Established:

The purposes for which the Rappahannock River Valley National Wildlife Refuge was established are:

"...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds ... 16 U.S.C. § 715d (Migratory Bird Conservation Act)," and

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species or (B) plants ... 16 U.S.C. § 1534 (Endangered Species Act of 1973)," and

"... the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ... 16 U.S.C. § 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act of 1986)," and

"for the development, advancement, management, conservation, and protection of fish and wildlife resources ... 16 U.S.C. § 742f(a)(4) (Fish and Wildlife Act of 1956)."

National Wildlife Refuge System Mission: To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Proposed Use: The following questions and answers provide a concise description of the proposed use.

1. What is the use? Is the use a priority public use? The use is retrieval of hunting dogs on the refuge during the State regular firearms hunting season for white-tailed deer. This use is not a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997.

2. Where would the use be conducted? We would allow this use on all refuge properties, but we expect it will be primarily confined to those tracts that are in proximity to private lands where deer hunting occurs.

3. When would the use be conducted? Retrieval of hunting dogs would be allowed only during the regular firearms hunting season for white-tailed deer. This is currently the only time when the use of pursuit dogs for deer hunting is permitted by the State.

4. How would the use be conducted? Special use permits would be issued upon request to the owners of dogs that are used to pursue deer during the State firearms season. If hunting dogs accidentally enter the refuge during the hunting season, dog owners would be permitted to enter the refuge by foot or vehicle to catch and remove the dogs without committing a violation of refuge regulations. The following special conditions will apply to each permit issued:

1. The permittee will make a reasonable effort to ensure that his/her dogs, or dogs under their custody, do not enter refuge lands at any time. If the permittee makes a reasonable effort to ensure that their dogs do not enter refuge lands, accidental entry of dogs will be permitted on the refuge temporarily while the owner, custodian, or a person under their behalf makes efforts to catch said dogs until they are removed from the refuge.
2. During the general firearms season for deer hunting, as set by the Virginia Department of Game and Inland Fisheries, if the permittee's dogs, or dogs under his/her custody, enter the refuge accidentally, the permittee will be allowed access to refuge lands for the purpose of retrieving his/her dogs or other dogs under his/her custody.
3. Prior to entering the refuge to retrieve dogs, the permittee must call the headquarters office at 804-333-1470 to inform refuge staff and will provide such information as is requested, such as location, estimated time needed to retrieve the dogs, number of dogs, vehicle information, etc. If no one answers, they must leave a message which includes their name, date, time, and location of the incident.
4. After getting permission to retrieve dogs or leaving a message, dog owners will immediately make reasonable efforts to retrieve their dogs until they are caught and removed from the refuge.
5. Dog retrieval is permitted by foot or vehicle. All vehicles must remain on hard surface refuge roads; no driving in fields or along mowed paths. Vehicles must not block road, or access to any road or mown path for permitted hunters. If a particular refuge tract is gated and locked, the permittee will be given the combination of the lock and may proceed through the gate. Gates must be locked while the permittee is on the refuge to prevent unauthorized access, and must be locked again upon leaving the refuge. The combination to locks will be changed routinely, so permittees must call the office at the number listed above under condition #3 to obtain or verify the combination prior to attempting to retrieve their dogs. Normal office hours are Monday through Friday, 8:00 a.m. to 4:30 p.m. If permittees expect a need to retrieve their dogs at a time when the office is unstaffed, they should call during office hours to obtain the combination. If for any reason the permittee cannot obtain the combination or if the lock will not open, access will be by foot only.
6. If any refuge staff member observes a dog on the refuge and contacts the owner, the owner will take immediate steps to remove the dog from the refuge.
7. All dogs will, at a minimum, be equipped with a dog collar bearing the name and phone number of the owner or custodian.
8. During the periods listed above in #2, upon a minimum of 30 days notice from the refuge, the permittee will refrain from letting his/her dogs loose where they might be expected to interfere with planned refuge activities, such as the Christmas Bird Count, refuge muzzleloader hunts dates, or special public events.
9. Permittee must not possess deer, tagged or untagged, or any other game while searching for dogs on the refuge.

10. Permittee must adhere to all other refuge, State, and local regulations while retrieving dogs, including but not limited to: unauthorized possession of a firearm or weapon (on their person or in a vehicle), operating a vehicle off designated roadway, entering or remaining on the refuge after dark, use of artificial light to locate wildlife on the refuge. When in doubt, ask the refuge manager, refuge personnel, or law enforcement officer.

11. This permit may be revoked if the permittee violates the conditions of the permit or any other refuge regulation.

12. All conditions of this permit are enforceable by law under title 50 Code of Federal Regulations Wildlife and Fisheries PART 26—PUBLIC ENTRY AND USE Subpart B—Public Entry § 26.22 General exception for entry... (b) A permit shall be required for any person entering a national wildlife refuge, unless otherwise provided under the provisions of subchapter C. The permittee will abide by all the terms and conditions set forth in the permit.

5. Why is the use being proposed?

The purpose of this special use permit is to allow dog owners and handlers to retrieve hunting dogs when they have accidentally entered the Rappahannock River Valley National Wildlife Refuge during general firearms hunting season for deer. The permit also allows the temporary presence of accidentally introduced hunting dogs on the refuge while they are being retrieved.

Hunting deer with pursuit dogs is a traditional and legal method in the counties of the Northern Neck and Middle Peninsula. However, Refuge System regulations prohibit domestic animals, including dogs, to roam at large on any national wildlife refuge. State regulations that allow retrieval of hunting dogs from private land do not apply to refuge lands. We recognize that to strictly enforce Federal regulations would essentially eliminate this traditional method of hunting from lands in close proximity to refuge lands. Therefore we have instituted this permit to allow hunting dogs, hunting dog owners, and those acting on behalf of hunting dog owners, to legally enter the refuge and retrieve their dogs during hunting season when dogs frequently enter the refuge accidentally from adjoining private lands. The permit is based on several assumptions, as described below:

We have had many conversations with dog owners over the past several years in an attempt to develop a mutually-acceptable solution to this issue. We acknowledge that the problem of dogs running at large on the refuge outside of the hunting season has decreased significantly due to cooperation from dog owners. We understand that the refuge attracts dogs released on adjoining lands due to the presence of game animals. We believe that dog owners in general want to retrieve their dogs from refuge lands because if game animals being pursued stay on refuge lands, they are unavailable for harvest by hunters on private lands. However, we recognize that by instituting this permit system, we are opening up the potential for its abuse. For example:

Since many refuge properties are open for deer hunting, dog owners and/or fellow hunt club members could apply for a refuge hunting permit and release dogs on adjoining private lands with the expectation that the dogs would run deer in their direction. This would essentially be the same as hunting with dogs on the refuge, which is prohibited. If we document this activity, the permit may be revoked and violation notices may be issued to the individuals involved.

Similarly, dog owners may release their dogs immediately adjacent to refuge lands with the expectation that the dogs will pursue game through refuge lands to hunters waiting on or near the refuge boundary on the opposite side of the tract. This type of activity shows the intentional release of dogs near or around the refuge and again, if this activity is documented, the permit may be revoked and violation notices may be issued.

There are certain dates when dogs on the refuge during the permitted period are more problematic. These include the refuge muzzleloader hunt dates, dates of wildlife surveys such as the annual Christmas Bird Count, and special public events. The Christmas Bird Count is held each year on

the first or second Saturday before Christmas. At the time the permit is prepared and signed, or at least within 30 days of the events, we will inform permit holders of these dates and ask that they take special care not to allow their dogs to enter the refuge. Retrieval permits will not be valid on those dates.

This permit is the only method the refuge has to allow free-roaming dogs to be on the refuge legally, and for them to be legally retrieved. Persons whose dogs may roam on the refuge will be afforded the opportunity to sign and hold an annual permit. Dog owners whose animals are found on the refuge and who have refused to sign a permit, are subject to prosecution.

Dogs that are found roaming at large on the refuge outside of the permitted dates (as specified on the permit or on special occasions where dog owners are notified within 30 days as outlined above), will constitute a violation of federal law title 50 CFR 26.21(b), and the owner of such dogs may have their permit revoked, and or may be issued a federal violation notice with a fine (at time of writing) of not less than \$95 for each dog.

We expect to continue to work cooperatively with dog owners and other hunters to refine and adjust the permit conditions as is necessary to protect refuge visitors, protect wildlife, provide refuge hunters with a quality hunting experience, and promote the traditions of hunting that have existed for generations on the Northern Neck and Middle Peninsula.

Availability of Resources: Staff resources required to administer this program include the time it takes to prepare permits, issue permits, enforce permit conditions, prepare news releases, and answer inquiries. We expect this will amount to an annual cost of less than \$500, with the exception of law enforcement. Enforcement of the permit will be done in conjunction with other law enforcement patrol duties during the hunting seasons and therefore will result in no added costs. Sufficient funds to administer this permit program are available in the expected annual base budget of \$850,000.

Anticipated Impacts on Refuge Purpose: As noted on page one of this compatibility determination, there are four purposes for establishment and management of this refuge. In general, they relate to four primary conservation and management responsibilities:

1. Migratory birds,
2. Threatened and endangered plant and animal species,
3. Wetlands, and
4. Other fish and wildlife resources.

Following is a discussion on the anticipated impacts of the proposed uses related to the resources listed within refuge purposes.

Potential impacts to birds: The presence of dogs and pedestrians on the refuge, either on trails or off trails, is likely to cause temporary disturbance to birds. A study done in Colorado (Miller et al. 2001) found that robins, representing forest species, and western meadowlarks and vesper sparrows, representing grassland species, flushed when approached by dogs on and off leash. Dogs alone generally resulted in less disturbance than when pedestrians were present, either alone or holding a leashed dog. The authors surmised that because dogs resemble coyotes and foxes, which are not considered significant predators of songbirds (Leach and Frazier 1953, Andelt et al. 1987), they may not have been perceived as an important threat. Disturbance was generally greater off trails than on trails.

There are two primary factors which lead us to believe that the level of disturbance will not materially interfere with our migratory bird purposes. One is that dogs alone are not likely to cause significant disturbance beyond that caused by foxes and coyotes. This belief is supplemented by the fact that hunting season occurs outside the breeding season for birds, which would be a more sensitive period in terms of protecting songbirds from disturbance. Secondly, most dog owners retrieving their animals will do so from existing roads. They will try to intercept the dogs as they

move through the tracts, rather than chase after them through fields and woods. They also employ calls to retrieve dogs, so the dogs come to them rather than them chasing the dogs. Any disturbance would be temporary and should not lead to loss of migratory birds or their habitats.

Potential impacts to threatened and endangered species: The only federal-threatened species known to exist on the refuge is the sensitive joint-vetch, a plant with a very restricted range. It is only found in freshwater tidal marshes, usually along the edge of the marsh where it meets a stream or other habitat type. It is unlikely that this species will be encountered by either dogs or humans, but if it is, the impacts will be negligible as the plant will have set seeds and gone dormant by the hunting season. Some disturbance may even favor the plant as it is somewhat dependent on disturbance to set new seed.

Bald eagles were delisted as a threatened species in 2007, but remain a management focus for the refuge. We have no evidence to suggest that the temporary presence of dogs or permittees on the refuge will have negative effects on bald eagle nesting or roosting. If necessary to prevent disturbance, we will post sensitive bald eagle areas, such as nests and known roosts, as closed areas for dog retrieval purposes.

Potential impacts to wetlands: It is likely that dogs will enter refuge wetlands and cause minor trampling of wetland vegetation. Because this would occur during the dormant season for plants, the disturbance by dogs would not impact growth or productivity of wetland plants. It is less likely that persons retrieving dogs would enter wetlands, but it is a possibility. However, the result is much the same, as it would occur during the dormant season.

Potential impact to other fish and wildlife resources: We have reviewed literature on the effects of dogs, feral and hunting dogs, on white-tailed deer, rabbits, and raccoons (Sweeney et al. 1971, Marchinton et al. 1970, Corbett et al. 1971, Murphy et al. undated, Causey and Cude 1980, and Cantrell 1989). From this review, we have determined that the temporary presence of hunting dogs on the refuge during the fall is likely to cause deer, and possibly other wildlife, to move and perhaps temporarily leave their home range. However, there is no evidence to suggest that this level of disturbance would have an adverse impact on populations, nor is there evidence to suggest that direct mortality of healthy individual animals would occur from this level of disturbance.

Public Review and Comment: This determination was made available for a 30-day public review and comment period in conjunction with the release of the Draft Comprehensive Conservation Plan for the refuge.

Determination (check one below):

Use is Not Compatible

 X

Use is Compatible With the Following Stipulations

Stipulations Necessary to Ensure Compatibility: The keys to continued compatibility of this program are compliance with the conditions of the special use permit, and strict enforcement of these conditions along with other refuge regulations. If these criteria are met, there should be no other stipulations necessary to ensure compatibility. We will continue to monitor the program and make necessary adjustments to ensure continued effectiveness and compatibility.

Justification

Hunting deer with pursuit dogs is a tradition on the Northern Neck and Middle Peninsula of Virginia where the Rappahannock River Valley National Wildlife Refuge is located. Hunting is one of the six

priority uses of the National Wildlife Refuge System, and is a traditional form of wildlife-dependent recreation supported by the Service. Public hunting is also one of the most efficient methods of maintaining the health and balance of deer populations. Refuge regulations prohibit free-roaming domestic animals, including dogs. To strictly enforce this regulation would eliminate a legal, traditional method of deer hunting on private lands surrounding the refuge. The refuge manager has the authority to issue special use permits, provided that the use is compatible with refuge purposes and the mission of the Refuge System. We have researched the potential impacts from the temporary presence of dogs, and persons retrieving dogs, during the State firearms hunting season and find that the impacts will not prevent the refuge from accomplishing its purposes.

Therefore, in accordance with 50 CFR 26.41, permitting dog owners or their surrogates to retrieve hunting dogs that have entered the Rappahannock River Valley National Wildlife Refuge during the regular State firearms season for deer hunting as described herein, will not materially interfere with, or detract from, the fulfillment of the National Wildlife Refuge System mission or the purposes for which the refuge was established.

Signature: Refuge Manager: Joseph F. McCauley 12/14/09
(Signature and Date)

Concurrence: Regional Chief: Anthony D. Legé 12/21/2009
(Signature and Date)

Mandatory 10- year Re-evaluation Date: DECEMBER 21, 2019

Literature Cited

- Andelt, W.F., J.G. Kie, F.F. Knowlton, and K. Cardwell. 1987. Variation in coyote diets associated with season and successional changes in vegetation. *Journal of Wildlife Management* 51:273-277.
- Cantrell, M.A. 1989. Characteristics of a managed raccoon population in east Tennessee with an emphasis on summer dog training and fall harvest. Tennessee Wildlife Resources Agency Technical Report 89-1. 100pp.
- Causey, M.K. and C.A. Cude. 1980. Feral dog and white-tailed deer interactions in Alabama. *Journal of Wildlife Management* 44(2):481-484.
- Corbett, R.L., R.L. Marchinton, and C.E. Hill. 1971. Preliminary study of the effects of dogs on radio-equipped deer in a mountainous habitat. Southeastern Association of Game and Fish Commissioners, 25th Annual Conference Proceedings, 69-77.
- Leach, H.R., and W.H. Fraizer. 1953. A study of the possible extent of predation on heavy concentrations of valley quail with special reference to the bobcat. *California Fish and Game* 39:527-538.
- Marchinton, R.L., A.S. Johnson, J.R. Sweeney, and J.M. Sweeney. 1970. Legal hunting of white-tailed deer with dogs: biology, sociology and management. Southeastern Association of Game and Fish Commissioners, 24th Annual Conference Proceedings, 74-88.
- Miller, S.G., R.L. Knight and C.K. Miller. 2001. Wildlife responses to pedestrians and dogs. *Wildlife Society Bulletin* 29(1):124-132.
- Murphy, B.P., D.A. Osborn, R.L. Marchinton, and J.C. Kurz. Undated. Characteristics of an enclosed cottontail (*Sylvilagus floridanus*) population subjected to frequent beagle chasing. 5pp.
- Sweeney, J.R., R.L. Marchinton, and J.M. Sweeney. 1971. Responses of radio-monitored white-tailed deer chased by hunting dogs. *Journal of Wildlife Management* 35(4): 707-716.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Rappahannock River Valley NWRUse: Bicycling Off-road

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?		✓
(d) Is the use consistent with public safety?		✓
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✓
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?		✓
(h) Will this be manageable in the future within existing resources?		✓
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		✓

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ☐ No ☒

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ☒Appropriate ☐Refuge Manager: Joseph F. McCauleyDate: Dec 14, 2009

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Acting Refuge Supervisor: Virginia E. BettyDate: December 21, 2009

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Eastern Virginia Rivers NWR Complex
Rappahannock River Valley NWR

Rationale for determination of **bicycling off-road** as inappropriate

Prior to allowing any use of the refuge, the refuge manager must first determine if the use is appropriate, and if so, he or she must then complete a compatibility determination. The six priority wildlife dependent recreational uses (environmental education, fishing, hunting, interpretation, wildlife observation and wildlife photography) are considered by policy to be appropriate. Therefore, only general public uses or specialized uses must be evaluated for their appropriateness.

We have evaluated bicycling off road and the refuge manager has determined that this use is not appropriate.

The primary reason for this determination is derived from Service policy on Appropriate Refuge Uses (603 FW 1). The policy states that: "General public uses that are not wildlife-dependent recreational uses (as defined by the Improvement Act) and do not contribute to the fulfillment of refuge purposes or goals or objectives as described in current refuge management plans are the lowest priorities for refuge managers to consider. These uses are likely to divert refuge management resources from priority general public uses or away from our responsibilities to protect and manage fish, wildlife, and plants, and their habitats. Therefore, both law and policy have a general presumption against allowing such uses within the Refuge System."

Rappahannock River Valley National Wildlife Refuge was established for the following purposes:

"...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds ... 16 U.S.C. § 715d (Migratory Bird Conservation Act)," and

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species or (B) plants ... 16 U.S.C. § 1534 (Endangered Species Act of 1973)," and

"... for the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ... 16 U.S.C. § 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act of 1986)," and

"for the development, advancement, management, conservation, and protection of fish and wildlife resources ... 16 U.S.C. § 742f(a)(4) (Fish and Wildlife Act of 1956).

The refuge manager has determined that bicycling off road has not met seven of the ten criteria for a general public use to be considered appropriate. A brief explanation follows:

Bicycling off road on trails or cross country could cause damage to refuge soils and vegetation, as well as unacceptable levels of wildlife disturbance. It is not consistent with Service policy on secondary uses and is not consistent with any approved refuge management plan. Allowing bicycles on wildlife observation trails would likely divert future resources from accomplishing priority tasks and cause conflicts with priority public uses. We would have to spend more time and funding to repair ruts and tracks from bicycles and the trails are not wide enough to support bicycles and pedestrians and would be particularly problematic if wheelchairs were being used on the trails. As a means of transportation or exercise, bicycling in itself does not add to the understanding or appreciation of natural resources. However, as a means of access to refuge facilities, bicycling would not create any more disturbance than motorized vehicles, and therefore will not be prohibited on refuge roads.

There are other uses that are prohibited by regulation as listed in Title 50 of the Code of Federal Regulations. We will not list all prohibited activities, but following are summaries of some of the

more commonly seen violations and the accompanying citations from 50 CFR:

The following activities are prohibited on the refuge:

Trespass in a closed or unauthorized area [50 CFR 26.21(a)];
Permitting unconfined domestic animals to enter or roam at large [50 CFR 26.21(b)];
Motor vehicle use except on designated routes of travel [50 CFR 27.31];
Disturbing, injuring, collecting, or attempting to do the same to any plant or animal [50 CFR 27.51];
Introducing or liberating plants and animals or their parts taken elsewhere [50 CFR 27.52];
Destruction, defacement, or removal of public property, including natural objects [50 CFR 27.61];
Search for or removal of objects of antiquity [50 CFR 27.62];
Tampering with, or attempting to tamper with, any vehicle or equipment [50 CFR 27.65];
Interfering with any employee of the United States or any state or local government engaged in official business [50 CFR 27.84].

This is by no means an exhaustive list of prohibited activities. Please be an informed visitor and consult the refuge manager when in doubt about a particular activity.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Rappahannock River Valley NWRUse: Camping

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?		✓
(d) Is the use consistent with public safety?		✓
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✓
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?		✓
(h) Will this be manageable in the future within existing resources?		✓
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ☐ No ☒

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ☒Appropriate ☐Refuge Manager: Joseph F. McConleyDate: Dec. 14, 2009

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Acting Refuge Supervisor: Virginia E. RettigDate: December 21, 2009

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Eastern Virginia Rivers NWR Complex
Rappahannock River Valley NWR

Rationale for determination of **camping** as inappropriate

Prior to allowing any use of the refuge, the refuge manager must first determine if the use is appropriate, and if so, he or she must then complete a compatibility determination. The six priority wildlife dependent recreational uses (environmental education, fishing, hunting, interpretation, wildlife observation and wildlife photography) are considered by policy to be appropriate. Therefore, only general public uses or specialized uses must be evaluated for their appropriateness.

We have evaluated camping and the refuge manager has determined that this use is not appropriate.

The primary reason for this determination is derived from Service policy on Appropriate Refuge Uses (603 FW 1). The policy states that: "General public uses that are not wildlife-dependent recreational uses (as defined by the Improvement Act) and do not contribute to the fulfillment of refuge purposes or goals or objectives as described in current refuge management plans are the lowest priorities for refuge managers to consider. These uses are likely to divert refuge management resources from priority general public uses or away from our responsibilities to protect and manage fish, wildlife, and plants, and their habitats. Therefore, both law and policy have a general presumption against allowing such uses within the Refuge System."

Rappahannock River Valley National Wildlife Refuge was established for the following purposes:

"...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds ... 16 U.S.C. § 715d (Migratory Bird Conservation Act)," and

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species or (B) plants ... 16 U.S.C. § 1534 (Endangered Species Act of 1973)," and

"... for the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ... 16 U.S.C. § 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act of 1986)," and

"for the development, advancement, management, conservation, and protection of fish and wildlife resources ... 16 U.S.C. § 742f(a)(4) (Fish and Wildlife Act of 1956).

The refuge manager has determined that camping has not met five of the ten criteria for a general public use to be considered appropriate. A brief explanation follows:

Camping is not consistent with Service policy on secondary uses and would divert existing and future resources from accomplishing priority tasks. It also presents unacceptable levels of risk from the potential spread of campfires to wildfires. This use is also not consistent with any approved refuge management plan.

There are other uses that are prohibited by regulation as listed in Title 50 of the Code of Federal Regulations. We will not list all prohibited activities, but following are summaries of some of the more commonly seen violations and the accompanying citations from 50 CFR:

The following activities are prohibited on the refuge:

Trespass in a closed or unauthorized area [50 CFR 26.21(a)];
Permitting unconfined domestic animals to enter or roam at large [50 CFR 26.21(b)];
Motor vehicle use except on designated routes of travel [50 CFR 27.31];
Disturbing, injuring, collecting, or attempting to do the same to any plant or animal [50 CFR 27.51];

Introducing or liberating plants and animals or their parts taken elsewhere [50 CFR 27.52];
Destruction, defacement, or removal of public property, including natural objects [50 CFR 27.61];
Search for or removal of objects of antiquity [50 CFR 27.62];
Tampering with, or attempting to tamper with, any vehicle or equipment [50 CFR 27.65];
Interfering with any employee of the United States or any state or local government engaged in official business [50 CFR 27.84].

This is by no means an exhaustive list of prohibited activities. Please be an informed visitor and consult the refuge manager when in doubt about a particular activity.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Rappahannock River Valley NWRUse: Dog Training and Field Trials

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?		✓
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✓
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?		✓
(h) Will this be manageable in the future within existing resources?		✓
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		✓

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ☐ No ☒

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ☒Appropriate ☐Refuge Manager: Joseph F. McCauleyDate: Dec. 14, 2009

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Acting Refuge Supervisor: Virginia E. RettigDate: December 21, 2009

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Eastern Virginia Rivers NWR Complex
Rappahannock River Valley NWR

Rationale for determination of **dog training and field trials** as inappropriate

Prior to allowing any use of the refuge, the refuge manager must first determine if the use is appropriate, and if so, he or she must then complete a compatibility determination. The six priority wildlife dependent recreational uses (environmental education, fishing, hunting, interpretation, wildlife observation and wildlife photography) are considered by policy to be appropriate. Therefore, only general public uses or specialized uses must be evaluated for their appropriateness.

We have evaluated dog training and field trials and the refuge manager has determined that this use is not appropriate.

The primary reason for this determination is derived from Service policy on Appropriate Refuge Uses (603 FW 1). The policy states that: "General public uses that are not wildlife-dependent recreational uses (as defined by the Improvement Act) and do not contribute to the fulfillment of refuge purposes or goals or objectives as described in current refuge management plans are the lowest priorities for refuge managers to consider. These uses are likely to divert refuge management resources from priority general public uses or away from our responsibilities to protect and manage fish, wildlife, and plants, and their habitats. Therefore, both law and policy have a general presumption against allowing such uses within the Refuge System."

Rappahannock River Valley National Wildlife Refuge was established for the following purposes:

"...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds ... 16 U.S.C. § 715d (Migratory Bird Conservation Act)," and

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species or (B) plants ... 16 U.S.C. § 1534 (Endangered Species Act of 1973)," and

"... for the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ... 16 U.S.C. § 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act of 1986)," and

"for the development, advancement, management, conservation, and protection of fish and wildlife resources ... 16 U.S.C. § 742f(a)(4) (Fish and Wildlife Act of 1956).

The refuge manager has determined that dog trials have not met six of the ten criteria for a general public use to be considered appropriate. A brief explanation follows:

Dog training and field trials are inconsistent with Service policy on secondary uses and would divert existing and future resources from accomplishing priority tasks. They are not consistent with any approved refuge management plan. These activities would not contribute to a better understanding or appreciation of refuge resources and could interfere with other priority uses.

There are other uses that are prohibited by regulation as listed in Title 50 of the Code of Federal Regulations. We will not list all prohibited activities, but following are summaries of some of the more commonly seen violations and the accompanying citations from 50 CFR:

The following activities are prohibited on the refuge:

Trespass in a closed or unauthorized area [50 CFR 26.21(a)];
Permitting unconfined domestic animals to enter or roam at large [50 CFR 26.21(b)];
Motor vehicle use except on designated routes of travel [50 CFR 27.31];

Disturbing, injuring, collecting, or attempting to do the same to any plant or animal [50 CFR 27.51];
Introducing or liberating plants and animals or their parts taken elsewhere [50 CFR 27.52];
Destruction, defacement, or removal of public property, including natural objects [50 CFR 27.61];
Search for or removal of objects of antiquity [50 CFR 27.62];
Tampering with, or attempting to tamper with, any vehicle or equipment [50 CFR 27.65];
Interfering with any employee of the United States or any state or local government engaged in official business [50 CFR 27.84].

This is by no means an exhaustive list of prohibited activities. Please be an informed visitor and consult the refuge manager when in doubt about a particular activity.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Rappahannock River Valley NWRUse: Horseback riding

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?		✓
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✓
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?		✓
(h) Will this be manageable in the future within existing resources?		✓
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		✓

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes No ✓

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ✓Appropriate Refuge Manager: Joseph F. McCauleyDate: Dec. 14, 2009

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Acting Refuge Supervisor: Virginia E. PettyDate: December 21, 2009

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Eastern Virginia Rivers NWR Complex
Rappahannock River Valley NWR

Rationale for determination of **horseback riding** as inappropriate

Prior to allowing any use of the refuge, the refuge manager must first determine if the use is appropriate, and if so, he or she must then complete a compatibility determination. The six priority wildlife dependent recreational uses (environmental education, fishing, hunting, interpretation, wildlife observation and wildlife photography) are considered by policy to be appropriate. Therefore, only general public uses or specialized uses must be evaluated for their appropriateness.

We have evaluated horseback riding and the refuge manager has determined that this use is not appropriate.

The primary reason for this determination is derived from Service policy on Appropriate Refuge Uses (603 FW 1). The policy states that: "General public uses that are not wildlife-dependent recreational uses (as defined by the Improvement Act) and do not contribute to the fulfillment of refuge purposes or goals or objectives as described in current refuge management plans are the lowest priorities for refuge managers to consider. These uses are likely to divert refuge management resources from priority general public uses or away from our responsibilities to protect and manage fish, wildlife, and plants, and their habitats. Therefore, both law and policy have a general presumption against allowing such uses within the Refuge System."

Rappahannock River Valley National Wildlife Refuge was established for the following purposes:

"...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds ... 16 U.S.C. § 715d (Migratory Bird Conservation Act)," and

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species or (B) plants ... 16 U.S.C. § 1534 (Endangered Species Act of 1973)," and

"... for the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ... 16 U.S.C. § 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act of 1986)," and

"for the development, advancement, management, conservation, and protection of fish and wildlife resources ... 16 U.S.C. § 742f(a)(4) (Fish and Wildlife Act of 1956).

The refuge manager has determined that horseback riding has not met five of the ten criteria for a general public use to be considered appropriate. A brief explanation follows:

Horseback riding is not consistent with Service policy on secondary uses and would divert existing and future resources from accomplishing priority tasks. It also presents unacceptable levels of risk from the potential spread of invasive species from horse droppings and could present conflicts with other refuge users. This use is not consistent with any approved refuge management plan.

There are other uses that are prohibited by regulation as listed in Title 50 of the Code of Federal Regulations. We will not list all prohibited activities, but following are summaries of some of the more commonly seen violations and the accompanying citations from 50 CFR:

The following activities are prohibited on the refuge:

Trespass in a closed or unauthorized area [50 CFR 26.21(a)];
Permitting unconfined domestic animals to enter or roam at large [50 CFR 26.21(b)];
Motor vehicle use except on designated routes of travel [50 CFR 27.31];

Disturbing, injuring, collecting, or attempting to do the same to any plant or animal [50 CFR 27.51];
Introducing or liberating plants and animals or their parts taken elsewhere [50 CFR 27.52];
Destruction, defacement, or removal of public property, including natural objects [50 CFR 27.61];
Search for or removal of objects of antiquity [50 CFR 27.62];
Tampering with, or attempting to tamper with, any vehicle or equipment [50 CFR 27.65];
Interfering with any employee of the United States or any state or local government engaged in official business [50 CFR 27.84].

This is by no means an exhaustive list of prohibited activities. Please be an informed visitor and consult the refuge manager when in doubt about a particular activity.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Rappahannock River Valley NWRUse: Jogging Off-road

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?		✓
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✓
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		✓

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes No ✓

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ✓Appropriate Refuge Manager: Joseph F. McCauleyDate: Dec. 14, 2009

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Acting Refuge Supervisor: Virginia E. PettyDate: December 21, 2009

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Eastern Virginia Rivers NWR Complex
Rappahannock River Valley NWR

Rationale for determination of **jogging off road** as inappropriate

Prior to allowing any use of the refuge, the refuge manager must first determine if the use is appropriate, and if so, he or she must then complete a compatibility determination. The six priority wildlife dependent recreational uses (environmental education, fishing, hunting, interpretation, wildlife observation and wildlife photography) are considered by policy to be appropriate. Therefore, only general public uses or specialized uses must be evaluated for their appropriateness.

We have evaluated jogging off road and the refuge manager has determined that this use is not appropriate.

The primary reason for this determination is derived from Service policy on Appropriate Refuge Uses (603 FW 1). The policy states that: "General public uses that are not wildlife-dependent recreational uses (as defined by the Improvement Act) and do not contribute to the fulfillment of refuge purposes or goals or objectives as described in current refuge management plans are the lowest priorities for refuge managers to consider. These uses are likely to divert refuge management resources from priority general public uses or away from our responsibilities to protect and manage fish, wildlife, and plants, and their habitats. Therefore, both law and policy have a general presumption against allowing such uses within the Refuge System."

Rappahannock River Valley National Wildlife Refuge was established for the following purposes:

"...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds ... 16 U.S.C. § 715d (Migratory Bird Conservation Act)," and

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species or (B) plants ... 16 U.S.C. § 1534 (Endangered Species Act of 1973)," and

"... for the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ... 16 U.S.C. § 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act of 1986)," and

"for the development, advancement, management, conservation, and protection of fish and wildlife resources ... 16 U.S.C. § 742f(a)(4) (Fish and Wildlife Act of 1956).

The refuge manager has determined that jogging off road has not met four of the ten criteria for a general public use to be considered appropriate. A brief explanation follows:

Jogging is not consistent with Service policy on secondary uses and is not consistent with any approved refuge management plan. As a form of exercise, it does not contribute to a greater understanding or appreciation of natural resources. If we were to allow it on wildlife observation and interpretive trails, we believe it would cause conflicts with priority public uses. Jogging as a means of access to refuge facilities will be no more disturbing than vehicles or bicycles, and as such will not be prohibited on refuge roads.

There are other uses that are prohibited by regulation as listed in Title 50 of the Code of Federal Regulations. We will not list all prohibited activities, but following are summaries of some of the more commonly seen violations and the accompanying citations from 50 CFR:

The following activities are prohibited on the refuge:

Trespass in a closed or unauthorized area [50 CFR 26.21(a)];
Permitting unconfined domestic animals to enter or roam at large [50 CFR 26.21(b)];
Motor vehicle use except on designated routes of travel [50 CFR 27.31];
Disturbing, injuring, collecting, or attempting to do the same to any plant or animal [50 CFR 27.51];
Introducing or liberating plants and animals or their parts taken elsewhere [50 CFR 27.52];
Destruction, defacement, or removal of public property, including natural objects [50 CFR 27.61];
Search for or removal of objects of antiquity [50 CFR 27.62];
Tampering with, or attempting to tamper with, any vehicle or equipment [50 CFR 27.65];
Interfering with any employee of the United States or any state or local government engaged in official business [50 CFR 27.84].

This is by no means an exhaustive list of prohibited activities. Please be an informed visitor and consult the refuge manager when in doubt about a particular activity.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Rappahannock River Valley NWRUse: Pets on Refuge Roads and Trails

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?		✓
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✓
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?		✓
(h) Will this be manageable in the future within existing resources?		✓
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		✓

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ☐ No ☒

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ☒Appropriate ☐Refuge Manager: Joseph F. McRouleyDate: Dec 14, 2009

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Acting Refuge Supervisor: Virginia E. PettyDate: December 21, 2009

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Eastern Virginia Rivers NWR Complex
Rappahannock River Valley NWR

Rationale for determination of having pets on roads and trails as inappropriate

Prior to allowing any use of the refuge, the refuge manager must first determine if the use is appropriate, and if so, he or she must then complete a compatibility determination. The six priority wildlife dependent recreational uses (environmental education, fishing, hunting, interpretation, wildlife observation and wildlife photography) are considered by policy to be appropriate. Therefore, only general public uses or specialized uses must be evaluated for their appropriateness.

We have evaluated the use of having pets accompany visitors on roads and trails, and the refuge manager has determined that this use is not appropriate.

The primary reason for this determination is derived from Service policy on Appropriate Refuge Uses (603 FW 1). The policy states that: "General public uses that are not wildlife-dependent recreational uses (as defined by the Improvement Act) and do not contribute to the fulfillment of refuge purposes or goals or objectives as described in current refuge management plans are the lowest priorities for refuge managers to consider. These uses are likely to divert refuge management resources from priority general public uses or away from our responsibilities to protect and manage fish, wildlife, and plants, and their habitats. Therefore, both law and policy have a general presumption against allowing such uses within the Refuge System."

Rappahannock River Valley National Wildlife Refuge was established for the following purposes:

"...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds ... 16 U.S.C. § 715d (Migratory Bird Conservation Act)," and

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species or (B) plants ... 16 U.S.C. § 1534 (Endangered Species Act of 1973)," and

"... for the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ... 16 U.S.C. § 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act of 1986)," and

"for the development, advancement, management, conservation, and protection of fish and wildlife resources ... 16 U.S.C. § 742f(a)(4) (Fish and Wildlife Act of 1956).

The refuge manager has determined that having pets on refuge roads and trails has not met six of the ten criteria for a general public use to be considered appropriate. A brief explanation follows:

There are two primary issues of concern regarding pets, primarily dogs, on refuge roads and trails. First is disturbance to wildlife from dogs that are let off leash to run free. Initially, pets on a hand-held leash were permitted on the refuge. However, our experience shows that dog owners in particular routinely disregard leash provisions and let their animals run free. As of 2007, most of our roads and trails are adjacent to managed grasslands. Grassland-dependent birds are particularly susceptible to disturbance from free-roaming pets. Current, and predicted, law enforcement staff is insufficient to curtail this illegal activity. Additionally, free-roaming dogs can interfere with the intended use of wildlife observation trails by flushing birds from areas immediately adjoining trails, preventing them from being observed by legitimate users of these trails. Unleashed dogs may also accost other visitors, and dog feces along trails is both unaesthetic and a safety hazard.

There are other uses that are prohibited by regulation as listed in Title 50 of the Code of Federal Regulations. We will not list all prohibited activities, but following are summaries of some of the more commonly seen violations and the accompanying citations from 50 CFR:

The following activities are prohibited on the refuge:

Trespass in a closed or unauthorized area [50 CFR 26.21(a)];
Permitting unconfined domestic animals to enter or roam at large [50 CFR 26.21(b)];
Motor vehicle use except on designated routes of travel [50 CFR 27.31];
Disturbing, injuring, collecting, or attempting to do the same to any plant or animal [50 CFR 27.51];
Introducing or liberating plants and animals or their parts taken elsewhere [50 CFR 27.52];
Destruction, defacement, or removal of public property, including natural objects [50 CFR 27.61];
Search for or removal of objects of antiquity [50 CFR 27.62];
Tampering with, or attempting to tamper with, any vehicle or equipment [50 CFR 27.65];
Interfering with any employee of the United States or any state or local government engaged in official business [50 CFR 27.84].

This is by no means an exhaustive list of prohibited activities. Please be an informed visitor and consult the refuge manager when in doubt about a particular activity.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Rappahannock River Valley NWRUse: Picnicking

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?		✓
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✓
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?		✓
(h) Will this be manageable in the future within existing resources?		✓
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes No ✓

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ✓Appropriate Refuge Manager: Joseph F. McConleyDate: Dec 14, 2009

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Acting Refuge Supervisor: Virginia E. PettyDate: December 21, 2009

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Eastern Virginia Rivers NWR Complex
Rappahannock River Valley NWR

Rationale for determination of **picnicking** as inappropriate

Prior to allowing any use of the refuge, the refuge manager must first determine if the use is appropriate, and if so, he or she must then complete a compatibility determination. The six priority wildlife dependent recreational uses (environmental education, fishing, hunting, interpretation, wildlife observation and wildlife photography) are considered by policy to be appropriate. Therefore, only general public uses or specialized uses must be evaluated for their appropriateness.

We have evaluated picnicking and the refuge manager has determined that this use is not appropriate.

The primary reason for this determination is derived from Service policy on Appropriate Refuge Uses (603 FW 1). The policy states that: "General public uses that are not wildlife-dependent recreational uses (as defined by the Improvement Act) and do not contribute to the fulfillment of refuge purposes or goals or objectives as described in current refuge management plans are the lowest priorities for refuge managers to consider. These uses are likely to divert refuge management resources from priority general public uses or away from our responsibilities to protect and manage fish, wildlife, and plants, and their habitats. Therefore, both law and policy have a general presumption against allowing such uses within the Refuge System."

Rappahannock River Valley National Wildlife Refuge was established for the following purposes:

"...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds ... 16 U.S.C. § 715d (Migratory Bird Conservation Act)," and

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species or (B) plants ... 16 U.S.C. § 1534 (Endangered Species Act of 1973)," and

"... for the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ... 16 U.S.C. § 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act of 1986)," and

"for the development, advancement, management, conservation, and protection of fish and wildlife resources ... 16 U.S.C. § 742f(a)(4) (Fish and Wildlife Act of 1956).

The refuge manager has determined that picnicking has not met five of the ten criteria for a general public use to be considered appropriate. A brief explanation follows:

Picnicking, as a stand-alone activity, is not consistent with Service policy on secondary uses, nor is it consistent with any approved refuge management plan. Creation and maintenance of picnic areas would divert existing and future resources from accomplishing priority tasks. In itself, picnicking does not contribute to a better understanding or appreciation of refuge resources. While we will not provide facilities for picnicking or promote it as a stand-alone activity, we recognize that eating a snack or prepared meal in association with other permitted activities (such as fishing, hunting, and bird watching) can be essential to good health and safety and will not be prohibited.

There are other uses that are prohibited by regulation as listed in Title 50 of the Code of Federal Regulations. We will not list all prohibited activities, but following are summaries of some of the more commonly seen violations and the accompanying citations from 50 CFR:

The following activities are prohibited on the refuge:

Trespass in a closed or unauthorized area [50 CFR 26.21(a)];
Permitting unconfined domestic animals to enter or roam at large [50 CFR 26.21(b)];
Motor vehicle use except on designated routes of travel [50 CFR 27.31];
Disturbing, injuring, collecting, or attempting to do the same to any plant or animal [50 CFR 27.51];
Introducing or liberating plants and animals or their parts taken elsewhere [50 CFR 27.52];
Destruction, defacement, or removal of public property, including natural objects [50 CFR 27.61];
Search for or removal of objects of antiquity [50 CFR 27.62];
Tampering with, or attempting to tamper with, any vehicle or equipment [50 CFR 27.65];
Interfering with any employee of the United States or any state or local government engaged in official business [50 CFR 27.84].

This is by no means an exhaustive list of prohibited activities. Please be an informed visitor and consult the refuge manager when in doubt about a particular activity.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Rappahannock River Valley NWRUse: Swimming / Sunbathing

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?		✓
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✓
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ☐ No ☒

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ☒Appropriate ☐Refuge Manager: Joseph F. McCouleyDate: Dec 14, 2009

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Acting Refuge Supervisor: Virginia E. PettigDate: December 21, 2009

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Eastern Virginia Rivers NWR Complex
Rappahannock River Valley NWR

Rationale for determination of **swimming/sunbathing** as inappropriate

Prior to allowing any use of the refuge, the refuge manager must first determine if the use is appropriate, and if so, he or she must then complete a compatibility determination. The six priority wildlife dependent recreational uses (environmental education, fishing, hunting, interpretation, wildlife observation and wildlife photography) are considered by policy to be appropriate. Therefore, only general public uses or specialized uses must be evaluated for their appropriateness.

We have evaluated swimming/sunbathing and the refuge manager has determined that these uses are not appropriate.

The primary reason for this determination is derived from Service policy on Appropriate Refuge Uses (603 FW 1). The policy states that: "General public uses that are not wildlife-dependent recreational uses (as defined by the Improvement Act) and do not contribute to the fulfillment of refuge purposes or goals or objectives as described in current refuge management plans are the lowest priorities for refuge managers to consider. These uses are likely to divert refuge management resources from priority general public uses or away from our responsibilities to protect and manage fish, wildlife, and plants, and their habitats. Therefore, both law and policy have a general presumption against allowing such uses within the Refuge System."

Rappahannock River Valley National Wildlife Refuge was established for the following purposes:

"...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds ... 16 U.S.C. § 715d (Migratory Bird Conservation Act)," and

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species or (B) plants ... 16 U.S.C. § 1534 (Endangered Species Act of 1973)," and

"... for the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ... 16 U.S.C. § 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act of 1986)," and

"for the development, advancement, management, conservation, and protection of fish and wildlife resources ... 16 U.S.C. § 742f(a)(4) (Fish and Wildlife Act of 1956).

The refuge manager has determined that swimming/sunbathing have not met three of the ten criteria for a general public use to be considered appropriate. A brief explanation follows:

Swimming and sunbathing are not consistent with Service policy on secondary uses and are not consistent with any approved refuge management plan. They do not in themselves contribute to a better understanding or appreciation of refuge resources.

There are other uses that are prohibited by regulation as listed in Title 50 of the Code of Federal Regulations. We will not list all prohibited activities, but following are summaries of some of the more commonly seen violations and the accompanying citations from 50 CFR:

The following activities are prohibited on the refuge:

Trespass in a closed or unauthorized area [50 CFR 26.21(a)];
Permitting unconfined domestic animals to enter or roam at large [50 CFR 26.21(b)];
Motor vehicle use except on designated routes of travel [50 CFR 27.31];
Disturbing, injuring, collecting, or attempting to do the same to any plant or animal [50 CFR 27.51];
Introducing or liberating plants and animals or their parts taken elsewhere [50 CFR 27.52];
Destruction, defacement, or removal of public property, including natural objects [50 CFR 27.61];
Search for or removal of objects of antiquity [50 CFR 27.62];
Tampering with, or attempting to tamper with, any vehicle or equipment [50 CFR 27.65];
Interfering with any employee of the United States or any state or local government engaged in official business [50 CFR 27.84].

This is by no means an exhaustive list of prohibited activities. Please be an informed visitor and consult the refuge manager when in doubt about a particular activity.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Rappahannock River Valley NWRUse: Use of All-terrain Vehicles

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?		✓
(d) Is the use consistent with public safety?		✓
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✓
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?		✓
(h) Will this be manageable in the future within existing resources?		✓
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		✓

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ☐ No ☒

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ☒Appropriate ☐Refuge Manager: Joseph F. McCauleyDate: Dec 14, 2009

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Acting Refuge Supervisor: Virginia E. PettitDate: December 21, 2009

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Eastern Virginia Rivers NWR Complex
Rappahannock River Valley NWR

Rationale for determination of **all-terrain vehicle use** as inappropriate

Prior to allowing any use of the refuge, the refuge manager must first determine if the use is appropriate, and if so, he or she must then complete a compatibility determination. The six priority wildlife dependent recreational uses (environmental education, fishing, hunting, interpretation, wildlife observation and wildlife photography) are considered by policy to be appropriate. Therefore, only general public uses or specialized uses must be evaluated for their appropriateness.

We have evaluated the use of all-terrain vehicles and the refuge manager has determined that this use is not appropriate.

The primary reason for this determination is derived from Service policy on Appropriate Refuge Uses (603 FW 1). The policy states that: "General public uses that are not wildlife-dependent recreational uses (as defined by the Improvement Act) and do not contribute to the fulfillment of refuge purposes or goals or objectives as described in current refuge management plans are the lowest priorities for refuge managers to consider. These uses are likely to divert refuge management resources from priority general public uses or away from our responsibilities to protect and manage fish, wildlife, and plants, and their habitats. Therefore, both law and policy have a general presumption against allowing such uses within the Refuge System."

Rappahannock River Valley National Wildlife Refuge was established for the following purposes:

"...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds ... 16 U.S.C. § 715d (Migratory Bird Conservation Act)," and

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species or (B) plants ... 16 U.S.C. § 1534 (Endangered Species Act of 1973)," and

"... for the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ... 16 U.S.C. § 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act of 1986)," and

"for the development, advancement, management, conservation, and protection of fish and wildlife resources ... 16 U.S.C. § 742f(a)(4) (Fish and Wildlife Act of 1956).

The refuge manager has determined that the use of all-terrain vehicles has not met seven of the ten criteria for a general public use to be considered appropriate. A brief explanation follows:

Use of all-terrain vehicles is not consistent with two executive orders, E.O. 11644 and E.O. 11989 which require that refuges promote safety, minimize conflicts among users, monitor effects of ATV use if allowed, and to close areas to ATV use if they will cause adverse effects on soil, vegetation, wildlife, habitat or cultural or historic resources. This use is not consistent with any approved refuge management plan and would divert existing and future resources from accomplishing priority tasks. We do not believe it would contribute to public appreciation or understanding of the refuge's resources and we believe it could cause conflicts with priority public uses.

There are other uses that are prohibited by regulation as listed in Title 50 of the Code of Federal Regulations. We will not list all prohibited activities, but following are summaries of some of the more commonly seen violations and the accompanying citations from 50 CFR:

The following activities are prohibited on the refuge:

Trespass in a closed or unauthorized area [50 CFR 26.21(a)];
Permitting unconfined domestic animals to enter or roam at large [50 CFR 26.21(b)];
Motor vehicle use except on designated routes of travel [50 CFR 27.31];
Disturbing, injuring, collecting, or attempting to do the same to any plant or animal [50 CFR 27.51];
Introducing or liberating plants and animals or their parts taken elsewhere [50 CFR 27.52];
Destruction, defacement, or removal of public property, including natural objects [50 CFR 27.61];
Search for or removal of objects of antiquity [50 CFR 27.62];
Tampering with, or attempting to tamper with, any vehicle or equipment [50 CFR 27.65];
Interfering with any employee of the United States or any state or local government engaged in official business [50 CFR 27.84].

This is by no means an exhaustive list of prohibited activities. Please be an informed visitor and consult the refuge manager when in doubt about a particular activity.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Rappahannock River Valley NWRUse: Use of Pursuit Dogs for Hunting

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?		✓
(c) Is the use consistent with applicable Executive orders and Department and Service policies?		✓
(d) Is the use consistent with public safety?		✓
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✓
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		✓

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ☐ No ☒

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ☒Appropriate ☐Refuge Manager: Joseph F. McConleyDate: Dec. 14, 2009

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Acting Refuge Supervisor: Virginia E. PettigDate: December 21, 2009

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Eastern Virginia Rivers NWR Complex
Rappahannock River Valley NWR

Rationale for determination of use of pursuit dogs for hunting as inappropriate

Prior to allowing any use of the refuge, the refuge manager must first determine if the use is appropriate, and if so, he or she must then complete a compatibility determination. The six priority wildlife dependent recreational uses (environmental education, fishing, hunting, interpretation, wildlife observation and wildlife photography) are considered by policy to be appropriate. Therefore, only general public uses or specialized uses must be evaluated for their appropriateness.

We have evaluated use of pursuit dogs for hunting and the refuge manager has determined that this use is not appropriate.

The primary reason for this determination is derived from Service policy on Appropriate Refuge Uses (603 FW 1). The policy states that: "General public uses that are not wildlife-dependent recreational uses (as defined by the Improvement Act) and do not contribute to the fulfillment of refuge purposes or goals or objectives as described in current refuge management plans are the lowest priorities for refuge managers to consider. These uses are likely to divert refuge management resources from priority general public uses or away from our responsibilities to protect and manage fish, wildlife, and plants, and their habitats. Therefore, both law and policy have a general presumption against allowing such uses within the Refuge System."

Rappahannock River Valley National Wildlife Refuge was established for the following purposes:

"...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds ... 16 U.S.C. § 715d (Migratory Bird Conservation Act)," and

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species or (B) plants ... 16 U.S.C. § 1534 (Endangered Species Act of 1973)," and

"... for the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ... 16 U.S.C. § 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act of 1986)," and

"for the development, advancement, management, conservation, and protection of fish and wildlife resources ... 16 U.S.C. § 742f(a)(4) (Fish and Wildlife Act of 1956).

The refuge manager has determined that use of pursuit dogs for hunting has not met five of the ten criteria for a general public use to be considered appropriate. A brief explanation follows:

Free roaming dogs on refuge lands are prohibited by 50 CFR 26.21(b). Use of pursuit dogs for hunting, primarily deer hunting, is not consistent with certain criteria for a quality refuge recreational experience. The Service Manual (603 FW 1 and 605 FW 2) states that a quality recreational experience minimizes or eliminates conflicts with other compatible wildlife-dependent recreation, minimizes conflict with neighboring landowners, promotes accessibility and availability to a broad spectrum of the American people, and promotes stewardship and conservation. Free roaming dogs may jeopardize the safety of refuge visitors and staff, and may interfere with priority recreational uses, including still hunting for white-tailed deer. The use of pursuit dogs is not consistent with the approved refuge deer hunting plan.

There are other uses that are prohibited by regulation as listed in Title 50 of the Code of Federal Regulations. We will not list all prohibited activities, but following are summaries of some of the more commonly seen violations and the accompanying citations from 50 CFR:

The following activities are prohibited on the refuge:

Trespass in a closed or unauthorized area [50 CFR 26.21(a)];
Permitting unconfined domestic animals to enter or roam at large [50 CFR 26.21(b)];
Motor vehicle use except on designated routes of travel [50 CFR 27.31];
Disturbing, injuring, collecting, or attempting to do the same to any plant or animal [50 CFR 27.51];
Introducing or liberating plants and animals or their parts taken elsewhere [50 CFR 27.52];
Destruction, defacement, or removal of public property, including natural objects [50 CFR 27.61];
Search for or removal of objects of antiquity [50 CFR 27.62];
Tampering with, or attempting to tamper with, any vehicle or equipment [50 CFR 27.65];
Interfering with any employee of the United States or any state or local government engaged in official business [50 CFR 27.84].

This is by no means an exhaustive list of prohibited activities. Please be an informed visitor and consult the refuge manager when in doubt about a particular activity.

Appendix C

Sandy Spencer/USFWS



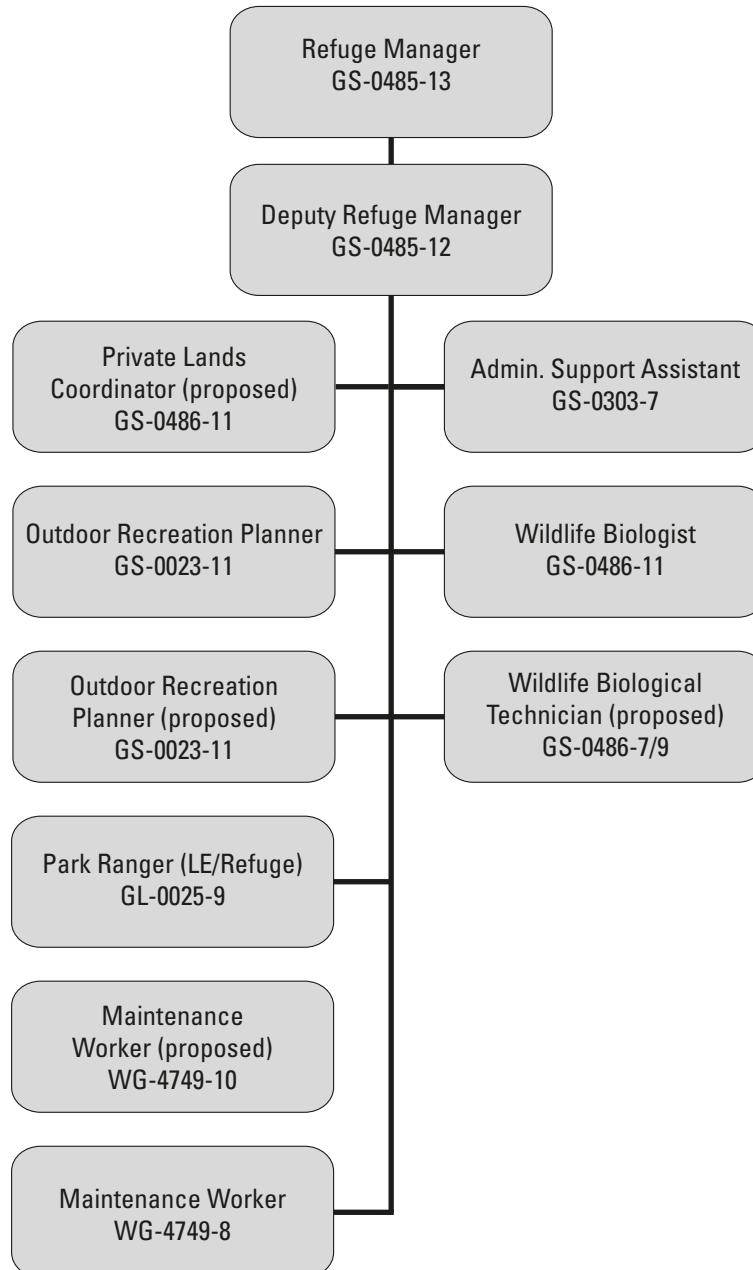
Snapping turtle eating pawpaw

Staffing Chart



Alternatives B & C — Staffing Chart Eastern Virginia Rivers National Wildlife Refuge Complex

(Includes Presquile/James River/
Rappahannock River Valley/Plum Tree Island NWRS)



Appendix D



USFWS

Green tree frog

Refuge Operations Needs (RONS) and Service Asset Maintenance Management Systems (SAMMS)

Table D.1. Proposed Refuge Operations Needs Projects (RONS) for Rappahannock River Valley Refuge

Project Title*	Costs (\$1,000)	Refuge* Rank	FTE ** (personnel)
PROJECTS			
Provide Visitor Services at Refuge (Outdoor Recreation Planner GS-11)	74.5	1	1.0
Improve Resource Management (Biological Technician GS-7/9)	50.3	2	1.0
Improve Maintenance Program (WG-10)	63.5	3	1.0
Initiate Private Lands Technical Asst Program (after securing permanent funding source; Private Lands Coordinator GS-11)	74.5	4	1.0
Total	262.8		4.0

*Project title and ranking may not exactly match current RONS database. They were modified based on goals and objectives developed for Alternative B in this CCP.

** FTE: full-time equivalent;

*** Based on FY09 pay/ grade, including benefits estimated at 32% of base salary

Table D.2. Service Asset Maintenance Management Systems (SAMMS) projects for Rappahannock River Valley Refuge

Project Title*	Costs (\$1,000)	Refuge* Rank
EXISTING FACILITIES		
Remove and Replace Wilna Boat Shed	156.0	1
Repair Laurel Grove House	107.0	2
Repair Wilna Quarters	159.0	3
Remove and Replace Hutchinson Storage Building	34.0	4
Rehabilitate Dirt Road at Thomas Tract	33.0	5
Repair Wellford Tract Access Road	286.0	6
Remove and Replace Wilna Stable	181.0	7
Total	956.0	
NEW FACILITIES		
New Administrative and Visitor Contact Facility (standard small design for up to 10 staff and 70,000 visitors; approx 6,845 sq feet)	\$4,072	1

Appendix E



USFWS

Wilna Pond in the Fall

National Historic Preservation Act Consultation



COMMONWEALTH of VIRGINIA

L. Preston Bryant, Jr.
Secretary of Natural Resources

Department of Historic Resources
2801 Kensington Avenue, Richmond, Virginia 23221

Kathleen S. Kilpatrick
Director

Tel: (804) 367-2323
Fax: (804) 367-2391
TDD: (804) 367-2386
www.dhr.virginia.gov

August 20, 2009

Ms. Nancy McGarigal
U.S. Fish and Wildlife Service
300 Westgate Center Drive
Hadley, MA 01035-9589

Re: Draft Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA)
Rappahannock River Valley National Wildlife Refuge
Richmond, Westmoreland, King George, Caroline, Essex, and Middlesex Counties, Virginia
DHR File No. 2005-1707

Dear Ms. McGarigal:

We have received the documents referenced above for our review. The CCP and EA duly recognize the historic sensitivity of the Rappahannock River Valley NWR and the potential of planned conservation activities to impact both known and unrecorded historic properties. It is essential that the USFWS consider the conservation and management of cultural resources along with other important resources within the NWR.

As defined by Federal regulation, the implementation of long-term conservation and management plans is an "undertaking" subject to Section 106 of the National Historic Preservation Act of 1966 (as amended). As such, the USFWS must consider the potential impact of planned activities on historic properties and consult with our office. The CCP and EA recognize this responsibility. It should be noted that all activities of a type that could impact historic properties if present must be coordinated with our office as there is no agreement between our agencies excluding any undertakings from review. Finally, given the presence of archaeological sites associated with the Native American occupation of the area, the USFWS has a responsibility to identify and consult any Indian tribes with an interest in the area. The Rappahannock Indian Tribe and Virginia Council on Indians should also be invited to review and comment on these documents. We look forward to working with the USFWS in the preservation of Virginia's natural and cultural heritage. If you have any questions, please do not hesitate to contact me at roger.kirchen@dhr.virginia.gov.

Sincerely,

A handwritten signature in dark ink, appearing to read "Roger W. Kirchen".

Roger W. Kirchen, Archaeologist
Office of Review and Compliance

Administrative Services
10 Courthouse Ave.
Petersburg, VA 23803
Tel: (804) 862-6416
Fax: (804) 862-6196

Capital Region Office
2801 Kensington Office
Richmond, VA 23221
Tel: (804) 367-2323
Fax: (804) 367-2391

Tidewater Region Office
14415 Old Courthouse Way
2nd Floor
Newport News, VA 23608
Tel: (757) 886-2807
Fax: (757) 886-2808

Roanoke Region Office
1030 Penmar Avenue, SE
Roanoke, VA 24013
Tel: (540) 857-7585
Fax: (540) 857-7588

Northern Region
Preservation Office
P.O. Box 519
Stephens City, VA 22655
Tel: (540) 868-7029
Fax: (540) 868-7033

Appendix F



Federal-threatened sensitive joint vetch

Endangered Species Act Consultation

1

Rappahannock NWR CCP RECEIVED

SEP 23 2009

INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION FORM
CONSULTATION/CONFERENCE/CONCURRENCE VIRGINIA FIELD OFFICE

Originating Person: Joseph McCauley

Signature:

Joseph F. McCauley

Date: September 22, 2009

I. Region: Northeast -- R-5

II. Service Activity (Program): NWRs, Rappahannock River Valley NWR CCP/EA

III. A. Listed species and/or their critical habitat within the action area:

Sensitive Joint Vetch (SJV) - *Aeschynomene virginica*

B. Proposed Species and/or proposed critical habitat within the action area:

N/A

IV. Geographic area or station name and action:

Northern Neck and Middle Peninsula, Rappahannock River Valley NWR acquisition boundary area.

V. Location (attach map):

A. County and State: Caroline, Essex, King George, Lancaster, Middlesex, Richmond, Westmoreland, VIRGINIA

B. Section, township and range (or latitude and longitude): See map

C. Distance (miles) and direction to nearest town: See map

VI. Proposed Action:

Refuges are required by the Refuge Improvement Act of 1997 to complete a Comprehensive Conservation Plan (CCP) and by the National Environmental Policy Act to complete an Environmental Assessment to accompany the CCP. The combined documents serve to guide refuge management decisions over the next 15 years, and inform the public and other interested parties, agencies, partners, communities of these plans. The Rappahannock River Valley NWR CCP/EA document explains the refuge mission and goals, describes the affected environment at the time of writing, offers 3 alternatives to management, describes the environmental consequences on the major habitat types for each alternative, and summarizes the consultation and coordination with others throughout this process. The primary distinction between the alternative concerns the number of acres of grasslands to be provided. Alternative B would offer up to 1200 acres over the current 600, and Alternative C proposes a forest emphasis with no grasslands. The document can be downloaded from the site: <http://www.fws.gov/northeast/planning/Rappahannock/ccphome.html>. References to SJV within this document occur on pages: 1-20; 2-14; 2-35-37; 3-82-83; 3-86; 3-88-90; 3-122; 4-27-31; 4-93; A-22; B-8; B-32-33; B-61; B-91.

VII. Explanation of impacts of action (attach additional pages as needed):

Across all three alternatives, and particularly in the preferred alternative (Alt B), we describe protection of wetlands and riparian zones, where sensitive joint vetch is likely to occur. Protection would come in the forms of land acquisition or easement, establishing vegetation buffers on the upland edges of wetlands, and controlling invasive plant species that threaten to overtake the marsh (Common reed, *Phragmites australis*). Treatment to control common reed undertaken by the Refuge is usually aerial or ground applications of aquatic-approved herbicides.

VIII. Effect of determination and response requested:

Natural disturbance events (storms and high energy wave action) actually create favorable areas for SJV to establish, and the species also occurs in a number of unexpected locations off refuge property within the acquisition boundary. Given its ephemeral pattern of occurrence, we do not anticipate the need for further protective measures other than those described above, or that the management actions described in the CCP/EA will have an adverse effect on the SJV population within the boundary area. We have developed standard operating procedures for protecting SJV populations during herbicide applications for *Phragmites* control. These procedures are described in a separate Section 7 Intra-Service Biological Evaluation Form.

A. For listed species/critical habitat:

Determination		Response Requested	
	Will Not Affect (Sensitive Joint Vetch)		Concurrence
			Informal Consultation
X	Is Not Likely to Adversely Affect (identify species)	x	Concurrence
			Informal Consultation
			Formal Consultation
	Is Likely to Adversely Affect (identify species)		Concurrence
			Informal Consultation
			Formal Consultation
	Undetermined Affect (identify species)		Informal Consultation

B. Proposed species/proposed critical habitat: N/A

C. Remarks: None

3

Rappahannock NWR CCP/EA

IX. Reviewing office evaluation:

A. Concurrence ☒Nonconcurrence ☐

B. Comments:

Tylan Dean, Acting Supervisor 9-24-09
Name/Signature/Date
Tylan Dean, for Cindy Schultz



**INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION FORM
CONSULTATION/CONFERENCE/CONCURRENCE**

Originating Person: Joseph McCauley

Signature:



Date: September 22, 2009

I. Region: Northeast – R-5

II. Service Activity (Program): NWRs, Rappahannock River Valley NWR

III. A. Listed species and/or their critical habitat within the action area:

Sensitive Joint Vetch (SJV) - *Aeschynomene virginica*

B. Proposed Species and/or proposed critical habitat within the action area:

N/A

IV. Geographic area or station name and action:

Northern Neck and Middle Peninsula, Rappahannock River Valley NWR acquisition boundary area.

V. Location (attach map):

A. County and State: **Caroline, Essex, King George, Lancaster, Middlesex, Richmond, Westmoreland, VIRGINIA**

B. Section, township and range (or latitude and longitude): **See map**

C. Distance (miles) and direction to nearest town: **See map**

VI. Proposed Action:

The Rappahannock River Valley National Wildlife Refuge proposes to control invasive populations of *Phragmites australis* using herbicides. Any herbicide used will be approved through a Pesticide Use Proposal form. As of this date, herbicides being used are imazapyr- or glyphosate-based and approved for aquatic environments. Herbicides may be applied by backpack sprayer, truck or boat mounted sprayer, or via helicopter. Applications will occur primarily within the refuge boundary as shown on the attached map, but may also occur on both public and private lands within the tidal portion of the Rappahannock River watershed.

VII. Explanation of impacts of action (attach additional pages as needed):

We have developed protocols for application of herbicides intended to minimize or eliminate negative impacts to *Aeschynomene virginica* during control operations. These protocols (attached) will employ techniques to avoid known or potential occurrences of *Aeschynomene virginica*, including use of models developed by the Virginia Department of Conservation and Recreation to predict where unknown populations of *Aeschynomene virginica* may exist.

Proposed Protocol to Ensure Protection of Sensitive Joint Vetch (*Aeschynomene virginica*)
as part of a
Control Program for Common Reed (*Phragmites australis*)

Introduction: Common reed (hereafter referred to as Phragmites) has been identified as one of the highest priority invasive species in the Northeast Region of the U.S. Fish and Wildlife Service. The Rappahannock River Valley National Wildlife Refuge works with landowners and other Federal, State, and county governments, and non-profit conservation organizations on control of invasive populations of Phragmites in the lower Rappahannock River watershed. We have secured two grants (North American Wetlands Conservation Act Small Grant and National Fish and Wildlife Foundation Pulling Together Initiative Grant) and other funding to conduct Phragmites control using applications of glyphosate via helicopter, boat- or truck-mounted sprayer, and backpack sprayer on public and private lands.

Spraying from a helicopter will be accomplished through contracts with professional applicators. Non-target effects will be minimized by applying chemicals with a precision nozzle and only during periods of minimal wind. The applicators have stated that drift will not occur more than 100 feet from the target area.

Sensitive joint vetch (*Aeschynomene virginica*) is an annual herb in the pea family that is listed as a Federally-threatened species by the U.S. Fish and Wildlife Service. Its habitat overlaps that of Phragmites and may be found in proximity to Phragmites stands targeted for control. Encroachment by Phragmites has been identified by the Virginia Division of Natural Heritage as a threat to sensitive joint vetch.

The following protocol will be used by the refuge and its partners to ensure protection of known or suspected populations of sensitive joint vetch during control operations.

Protocol:

Prior to issuing contracts or conducting control operations, we will have identified all proposed Phragmites locations to be treated and obtained landowner permission if on private lands.

In consultation with Virginia DCR, we will compare maps of known and potential populations of *Aeschynomene virginica* with maps of Phragmites stands proposed for control and determine which of the following three scenarios exists: 1) the proposed control area can be eliminated from concern due to salinity or other habitat factors that make the presence of *Aeschynomene virginica* unlikely; 2) the proposed control area is within 500 feet of known or historic populations of *Aeschynomene virginica*; or 3) the proposed control area is greater than 500 feet from any known or historic populations of *Aeschynomene virginica*, and due to habitat conditions is likely to support *Aeschynomene virginica*. We will use information from models developed by DCR in 2009 to help predict where unknown populations of *Aeschynomene virginica* might exist due to favorable habitat conditions.

Under scenario #1 above: Any spray methods (helicopter, boat or truck-mounted sprayer, or backpack sprayer) may be used.

Under scenarios #2 or #3 above: Surveys of suitable *Aeschynomene virginica* habitat within 500 feet of the proposed control areas will be conducted by qualified State, Federal, or private personnel. Names of survey personnel will be provided to the Service's Virginia Field Office for approval if requested.

If no *Aeschynomene virginica* plants are found within 500 feet, any spray methods (helicopter, boat or truck-mounted sprayer, or backpack sprayer) may be used.

If *Aeschynomene virginica* plants are found between 100 and 500 feet of the proposed control area, boat-mounted, truck-mounted, or backpack sprayers may be used.

If *Aeschynomene virginica* plants are found within 100 feet of the proposed control area: only backpack sprayers may be used if winds are greater than 10 mph. If winds are less than 10 mph, truck or boat-mounted sprayers may be used.

If *Aeschynomene virginica* plants are found within 10 feet of the proposed control area, only backpack spraying will occur.

New locations of sensitive joint-vetch will be marked with GPS equipment and sent to the Virginia DCR – Division of Natural Heritage.

VIII. Effect of determination and response requested:

By using the attached protocols, we expect that our actions are not likely to adversely affect known or expected occurrences of *Aeschynomene virginica*.

A. For listed species/critical habitat:

Determination		Response Requested	
	Will Not Affect (Sensitive Joint Vetch)		Concurrence
			Informal Consultation
X	Is Not Likely to Adversely Affect (identify species)	x	Concurrence
			Informal Consultation
			Formal Consultation
	Is Likely to Adversely Affect (identify species)		Concurrence
			Informal Consultation
			Formal Consultation
	Undetermined Affect (identify species)		Informal Consultation

B. Proposed species/proposed critical habitat: N/A

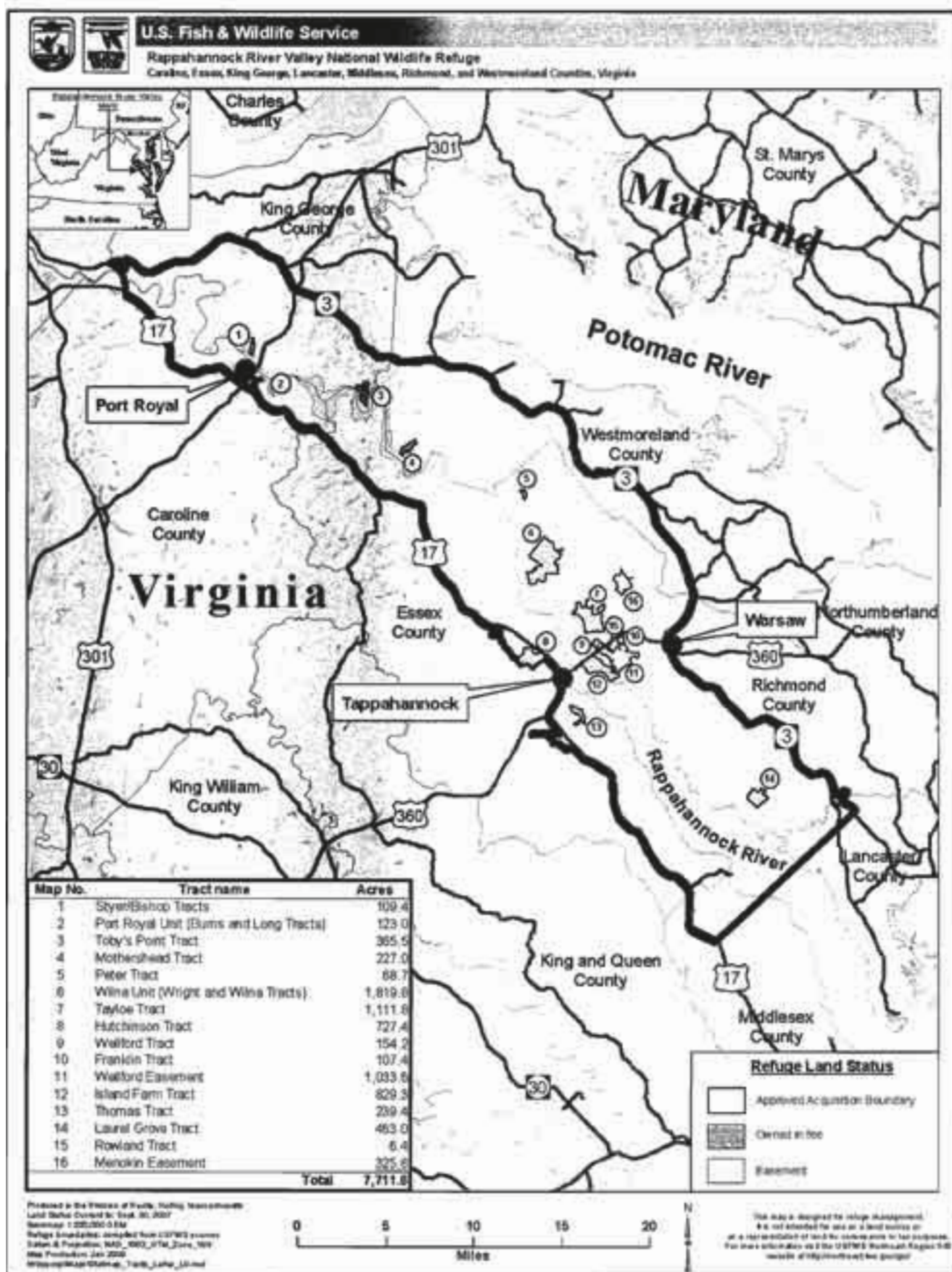
C. Remarks: None

IX. Reviewing office evaluation:

A. Concurrence X Nonconcurrence

B. Comments:

Tylan Dean, Acting Supervisor 9-24-09
 Name/Signature/Date
 Tylan Dean, for Cindy Schultz



Appendix G



USFWS

Having fun on youth fishing day

Summary of Public Comments and Service Responses on the Draft Comprehensive Conservation Plan and Environmental Assessment for the Rappahannock River Valley National Wildlife Refuge

Summary of Public Comments and Service Responses on the Draft Comprehensive Conservation Plan and Environmental Assessment for the Rappahannock River Valley National Wildlife Refuge

December 3, 2009

Introduction

In July 2009, we completed the “Rappahannock River Valley National Wildlife Refuge Draft Comprehensive Conservation Plan and Environmental Assessment” (Draft CCP/EA). That draft refuge plan outlines three alternatives for managing the refuge over the next 15 years, and identifies Alternative B as the “Service-preferred Alternative.” We released the draft plan for 35 days of public review and comment from July 23 to August 28, 2009.

We evaluated all the letters and e-mails sent to us during that comment period, along with comments recorded in our two public meetings. This document summarizes those comments and provides our responses to them. Based on our analysis in the Draft CCP/EA, and our evaluation of comments, we modified Alternative B, and recommended it to our Regional Director for implementation. It is that modified Alternative B which is detailed in this CCP. Our modifications include additions, corrections, or clarifications of our preferred management actions. We have also determined that none of those modifications warrants our publishing a revised or amended draft CCP/EA before publishing the CCP.

These are some important changes we made.

1. We included a map of the proposed public use facilities on the Wellford Tract that we inadvertently omitted in the draft CCP/EA.
2. We inserted language recognizing the important partnership we have with state agencies and the need to follow required state regulations during construction of new facilities.
3. We clarified our position on cooperative farming.
4. We clarified our position regarding use of gas-powered boats and water access.
5. We corrected all format and typographical errors that were brought to our attention.

Our Regional Director will either select our modified Alternative B for implementation, or one of the other two alternatives analyzed in the Draft CCP/EA, or a combination of actions from among the three alternatives. He will also determine whether a Finding of No Significant Impact (FONSI) is justified prior to finalizing his decision. He will make his decision after:

- Reviewing all the comments received on the Draft CCP/EA, and our response to those comments; and,
- Affirming that the CCP actions support the purpose and need for the CCP, the purposes for which the refuge was established, help fulfill the mission of the Refuge System, comply with all legal and policy mandates, and work best toward achieving the refuge’s vision and goals.

Concurrent with release of the approved CCP, we are publishing a notice of the availability in the *Federal Register*. That notice will complete the planning phase of the CCP process, and we can begin its implementation phase.

Summary of Comments Received

Given our interest in an objective analysis of the comments we received, we enlisted the U.S. Forest Service's Recreation Solutions Enterprise Team (FS) in compiling a database that would identify and code specific issues and concerns. That team has particular expertise in providing unbiased analyses of public comments on major proposals by federal land management agencies, a process called "content analysis". The team evaluated and coded all of the comments we received, including all letters, e-mails, and comments recorded at public meetings. Our responses below follow the subject headings in their coding structure.

During the comment period, we received 47 responses, both written and oral.

We gathered oral comments at the following two public meetings attended by 12 people:

July 30, 2009: Virginia Department of Game and Inland Fisheries Headquarters,
Richmond, Virginia

July 30, 2009: Rappahannock Community College-Warsaw Campus, Warsaw, Virginia

We received a consolidated letter compiled by the Virginia Department of Environmental Quality which included comments from the eight state agencies listed below. We either refer to that letter herein as the "VA DEQ" letter, or refer to respective agency comments.

Virginia Department of Game and Inland Fisheries (VA DGIF)

Virginia Department of Environmental Quality (VA DEQ)

Virginia Department of Conservation and Recreation (VA DCR)

Virginia Department of Health (VA DH)

Virginia Department of Transportation (VA DOT)

Virginia Marine Resources Commission (VA MRC)

Virginia Department of Historic Resources (VA DHR)

Virginia Department of Forestry (VA DOF)

We also received comments from these organizations.

Animal Protection Institute
Northern Virginia Chapter of Delta Waterfowl

In the discussions below, we address every substantive comment received. Occasionally, the FS would code the same comment under two or more subject headings. In our responses, we may refer the reader to other places in this document where we address the same comment.

Directly beneath each subject heading, you will see a list of unique letter ID numbers that correspond to the person, agency or organization that submitted the comment. The cross-referenced list appears as attachment 1 to this appendix.

In several instances, we refer to specific text in the Draft CCP/EA, and indicate how the CCP was changed in response to comments. You have several options for obtaining the full version of either the Draft CCP/EA or the CCP. They are available online at <http://www.fws.gov/northeast/planning/Rappahannock/ccphome.html>. For a CD-ROM or a print copy, contact the refuge headquarters.

Rappahannock River Valley National Wildlife Refuge
P. O. Box 1030
336 Wilna Road
Warsaw, VA 22572
Phone: (804) 333-1470
Fax: (804) 333-3396
Email: fw5rw_evrnwr@fws.gov

Service Responses to Comments by Subject

Planning Process and Policy

Public Involvement

(Letter ID#: 15, 41, 45)

Comment: Two members of the Northern Virginia Chapter of Delta Waterfowl ask the U.S. Fish and Wildlife Service (Service; we, us) to include their organizations in future planning and implementation activities at Rappahannock River Valley National Wildlife Refuge (Refuge). Both individuals write, "...We would like to be involved as much as possible."

A third commenter states there was a need to increase, "community outreach, refuge visitation, and develop new partners, work with local government and private attractions within the refuge acquisition boundary to develop a Northern Neck Visitor Trail Guide."

Response: We appreciate the interest in helping to implement the CCP. We will follow-up with those individuals and organizations with interest in our activities so we can determine specifically how they would like to be involved. We would also like to point out we currently engage many members of our community through working closely with the Rappahannock Wildlife Refuge Friends Group and our Volunteer Program.

With regard to increasing community outreach, and seeking new partners to coordinate such activities as a regional recreational guide, we whole-heartedly agree. Goal 5 in our plan is specifically intended to enhance our existing local and regional partnerships, and develop new ones. These partnerships help us make a meaningful contribution in the communities we serve and to strengthen support for the conservation missions of the Service and the Refuge System. In Chapter 4, under Goal 5, Objective 5.5—Local Partnerships, we identify a general strategy to "...collaborate on special projects with existing partners..." We have also now added a strategy under this objective to work with partners to develop a Northern Neck regional visitor's guide.

Document (Clarity, Technical, Editorial, Availability of Document on Website)

(Letter ID#: 19, 24, 44, 45, 47)

Comment: A couple of commenters state they could not access the webpage link to the documents, including a link printed in a local newspaper.

Response: We regret this inconvenience and apologize for any frustration that resulted. We submitted a news release to several media outlets, including newspapers. One publication copied our webpage link incorrectly. We are not always able to obtain proofs prior to publication, but will continue to request them to avoid this problem in the future.

Comment: Several commenters point out typographical errors, corrections, or updates they recommend we fix in the CCP. In some cases, the commenter suggests different language to use to help clarify a point we were trying to make. One commenter suggests we consistently use the Service's standard question format for all compatibility determinations. The deer hunting compatibility determination in Appendix B of the Draft CCP/EA was pointed out as an example of one that was inconsistent. This person also recommends that the previously approved compatibility determinations for cooperative farming, research, and deer hunting which were published in Appendix B be "...re-signed and dated prior to issuance of the CCP. This will ensure all of the compatibility determinations in the final CCP are current, and have the same mandatory 10 or 15 year reevaluation times."

Response: We are sure our readers can appreciate how, given the level of detail we provide in these plans, that we are bound to have typographical errors or passages in the document that need clarification. In the CCP, we correct all typographical or factual errors that were brought to our attention, and changed some text with suggested language.

With regards to re-issuing existing, approved compatibility determinations, the Refuge Manager felt that no change was needed to the three existing determinations mentioned (i.e. cooperative farming, research, and deer hunting), so they were incorporated as is. There is no requirement to re-issue them prior to their mandatory re-evaluation date if no new significant information warrants it. These approved compatibility determinations are included in their original format in the Draft CCP/EA and in the CCP. Subsequent re-evaluations of those individual compatibility determinations will incorporate the Service's recommended format.

Statutory and Regulatory Authority (Acts, Mandates & Policies)

(Letter ID#: 37, 47)

Comment: One commenter, writing on behalf of the Animal Protection Institute, is concerned that the Service is not addressing specific laws and policies in the proposed actions and analysis in the Draft CCP/EA. Specifically mentioned are the National Wildlife Refuge System Improvement Act of 1997 (16 U.S.C. 668dd), and Service policy (602 FW § 1.4A). This commenter states that current refuge activities have strayed from the intent of this law and policy which "...directs that wildlife comes first in the National Wildlife Refuge System" (602 FW § 1.4A). They further state "...our organization strongly believes that the Rappahannock River Valley National Wildlife Refuge should serve as a sanctuary for wildlife and as a native ecosystem preserve. Management should emphasize wildlife and habitat protection over public recreational uses." Activities they specifically mention that should receive detailed evaluations in compatibility determinations include "hunting, fishing, trapping, motor boating and jet skiing." The commenter also hopes we adopt a management policy "...stipulating that in instances where wildlife activity appears to be a threat to property, facilities, human safety, or threatened or endangered species protection, that humane, non-lethal management techniques will be used unless proven to be ineffective in the particular situation."

Response: We disagree that we have strayed from the intent of law and policies governing management of national wildlife refuges in our CCP. In Chapter 1 of the Draft CCP/EA, and Chapter 2 of the CCP, we describe the many laws, mandates, orders and Service policy

that we are consistent with in this CCP. The Refuge Improvement Act, referenced in the comment statement above, requires the Service to manage refuges as a system of lands (e.g. the National Wildlife Refuge System), not as individual field stations. The Act also defined six public uses and priority public uses to receive enhanced consideration in refuge planning documents. Those six uses are: hunting, fishing, wildlife observation, nature photography, environmental education, and interpretation. There was no priority assigned among the six uses. Refuge Managers are responsible for assessing whether a use is “appropriate” and “compatible” before they will allow it. To determine a use is compatible, the Refuge Manager must determine that the activity will not materially interfere with or detract from fulfilling the mission of the National Wildlife Refuge System or the establishing purposes of the refuge. The Refuge Manager also must be careful that the use does not detract from or conflict with other allowable uses. The use must be evaluated in terms of its anticipated impacts on refuge natural resources, and whether the staffing and funding for managing it are adequate.

In both the draft and final plans, in Appendix B, the Refuge Manager documents his decision on which compatible uses to allow for this refuge and why. Hunting and fishing are included. Activities not included are therefore not allowed, such as jet skiing and public trapping. Boating is only permitted to facilitate one or more of the six priority uses. No gas-powered motors are permitted and no launching facilities exist, or are planned, for power boats on refuge lands. In addition, we wish to point out that the Service does not have jurisdiction to control these activities on the river or in other navigable waters.

Comment: The VA DEQ letter comments extensively on the regulatory and coordination requirements of implementing the CCP. Much of what is referenced involves meeting local and state regulatory requirements and obtaining the correct permits before developing new facilities.

Response: We will adhere to all applicable permit rules and regulations required for national wildlife refuges. We will make this point in the CCP, Chapter 4, under “General Refuge Management, Refuge Staffing and Administration—Facilities Construction and Maintenance.” There were other management recommendations in the VA DEQ letter which we discuss under each respective subject heading below. Most of those recommendations are added to our CCP as strategies.

Request for Information

(Letter ID#: 27, 42, 44, 47)

Comment: The VA DEQ letter requests more detailed information regarding proposed construction activities. Their letter indicated that the information provided in the Draft CCP/EA was limited and unclear and lacking detail with respect to proposed construction activities. Consequently, the reviewing state agencies felt they could not adequately comment on planned construction projects, specifically the headquarters and visitor center on the refuge’s Hutchinson tract near Tappahannock. Although aerial photographs identifying tract boundaries and other information were included in the Draft CCP/EA, the comment is that they are not a proper substitution for topographic maps and site plans for the proposed

construction projects. Also, the reviewers felt the document does not provide necessary information on utilities and other associated impacts. The agencies request that, prior to implementing construction projects, the Service submit a Federal Consistency Determination in accordance with the Coastal Zone Management Act and federal consistency regulations implementing the Act.

Response: We plan to meet with affected state agencies once we have completed detailed site plans for the proposed new Headquarters and Visitor Facility on the Hutchinson tract. We will adhere to all applicable permitting rules and regulations to insure full compliance with the Coastal Zone Management Act and the requirements for a federal consistency determination.

Alternatives

(Letter ID#: 37)

Comment: One respondent, representing the Animal Protection Institute, expresses concern regarding the formulation of alternatives in the Draft CCP/EA. Their organization states a "... need for additional management alternatives." Specifically, they would like to see the following actions incorporated in an alternative: closing the refuge to hunting and trapping, prohibiting all motorized watercraft except when needed for wildlife observation or research, and the use of only non-lethal wildlife control methods when animals must be managed to reduce threats to property, facilities, human safety, or threatened or endangered species.

Response: We disagree that any of these actions warrants a separate alternative. With regards to hunting, the respective compatibility determination, in Appendix B of both the draft and final plans, explains our rationale for allowing it. Public trapping is not allowed on the refuge. We discuss trapping further under the section "Fish and Wildlife Resources" below. As stated above, boating is permitted only to facilitate one or more of the six priority uses. Launch areas are developed for small watercraft such as canoes, kayaks, and jon boats. Gas-powered motors are prohibited on refuge waters.

Alternative A: Current Management (No Action Alternative)

(Letter ID#: 20, 21)

Comment: Two commenters write in support of Alternative A. Their reasons include supporting "...the good of the wildlife assets in this pristine part of our Commonwealth" and not wanting to change current conditions.

Response: Alternative A was fully analyzed as an option in the Draft CCP/EA, but is not the alternative recommended by our planning team. Our team is recommending Alternative B because we believe, in our best professional judgment, it best achieves the purposes, vision, and goals of the refuge; contributes to the mission of the Refuge System; adheres to Service policies and other mandates; addresses identified issues of significant; and, incorporates sound principles of fish and wildlife science. In summary, we believe it fully protects and enhances the wildlife resources we are entrusted to manage.

Alternative B: Enhanced Habitat Diversity (Service-preferred Alternative)

(Letter ID#: 3, 30, 32, 33, 35, 43, 47)

Comment: Seven respondents specifically comment that they prefer Alternative B, although not all gave reasons for that support. One respondent specifically supports Alternative B's continued "...grassland/old field management rather than moving to forest management." This person feels that managed forests are already well-represented within the region and that the, "...grassland concept is something we need here in this region, in my opinion." Others indicated support because of the proposal to evaluate waterfowl and/or turkey hunting opportunities, or because it included plans to increase refuge staff and support the volunteer program.

Response: We appreciate the support for our recommended alternative.

Refuge Physical, Natural and Biological Resources (General Comments)

(Letter ID#: 11, 37)

Comment: One respondent emphasizes that "...This area should continue to be a refuge for animals and birds and a protected area for plant life as well." They specifically mention the proposal to expand hunting opportunities as an activity that would detract from their idea of a refuge.

Response: Using our best professional judgment, we developed goals and objectives for Alternative B in the Draft CCP/EA, and carried them forth in the CCP that would conserve and protect natural resources. Those goals and objectives were developed after consulting with wildlife experts in federal and state agencies, as well as with researchers current in their field. Chapter 5 of both the Draft CCP/EA and CCP provide a summary of our coordination and consultation with others.

Comment: One commenter felt there is a need for a "...rigorous biological assessment" to assess the biological resources on the refuge. The commenter went on to request "...that the CCP include a thorough evaluation of all recreational activities presently allowed on the refuges and their impacts on native flora and fauna, particularly threatened and endangered species."

Response: We concur that an inventory and monitoring program, coupled with needed research, are important to evaluating the effects of our management. In Chapter 2 of the Draft CCP/EA, we describe many research studies, and inventory and monitoring activities which have been done on the refuge in recent years. We considered the results of each of these projects when developing our goals and objectives. Also in the Draft CCP/EA Chapter 2, a refuge step-down plan we commit to completing within two years of CCP approval is the Inventory and Monitoring Plan. That plan will detail "why, where, when and how" we will conduct inventory and monitoring activities, including those related to recreational activities, and will prioritize them. We also discuss in Chapter 3 of the Draft CCP/EA many

activities that have an inventory and monitoring component that are “Actions Common to All Alternatives” and we identify “Monitoring Elements” under Goals 1, 2 and 3, which are specific activities we want to incorporate into the step-down plan. All of the above inventory and monitoring activities are carried forth in the CCP.

We recognize the need to enhance and prioritize our monitoring, inventory, and research activities to insure we are utilizing an adaptive management strategy and adjusting to those results, as we discussed in our introduction to Alternative B in the Draft CCP/EA. We take very seriously our responsibility to protect fish, wildlife, and plant resources, especially those that are species of conservation concern. Federal-listed species, in particular, are a focus. Strategies under Goal 3, Objective 3.1., specifically mention activities to protect the Federal-listed sensitive joint vetch from threats, which would include human activities. Our Ecological Services Virginia Field office reviewed Alternative B and concurred that implementing it is not likely to have an adverse effect on any listed species. The results of that review and consultation are included as Appendix F.

Global Climate Change

(Letter ID#: 45)

Comment: One comment is on our discussion of global climate change in Chapter 2 of the Draft CCP/EA. The respondent requests that we explain other environmental factors, beyond climate change, that have contributed to the past loss and erosion of marshes. This person felt that we oversimplified this discussion and also suggested that we further explain the differences between salt water intrusion and sea level rise.

Response: We clarify several points we make in our discussion of climate change in the CCP in Chapter 3, under “Global Climate Change.”

Refuge Administration

(Letter ID#: 35)

Comment: One commenter, who volunteers on the refuge, advocates for the refuge to obtain additional staff and new building facilities. He states that he sees the need for the additional assistance based on his experiences working there.

Response: We appreciate this recognition of our needs. We carried forth in the CCP the Alternative B recommendation to increase our staff to 11, and to develop new facilities and improve existing ones to better serve the public across the four refuges in the Eastern Virginia Rivers Refuge Complex.

Solid Waste Management/Hazardous Materials

(Letter ID#: 47)

Comment: The VA DEQ comments on the solid and hazardous waste management requirements in Virginia. Their letter states, "...All Virginia localities are required, under the Solid Waste Management Planning Regulations, to identify the strategies they will follow on the management of their solid wastes to include items such as facility siting, long-term (20-year) use, and alternative programs such as materials recycling and composting." They suggested the Service conduct an environmental investigation to determine if there are any solid or hazardous waste sites in proximity to the property where the construction will be located and to identify any issues before construction should commence.

Response: We include these recommendations in the CCP. They have been added to Chapter 4, under "General Refuge Management, Refuge Staffing and Administration—Facilities Construction and Maintenance."

Resources

Air Quality

(Letter ID#: 47)

Comment: The VA DEQ letter comments on the impacts to air quality related to the open burning activities and localized effects from construction vehicles and equipment exhaust due to the construction activities proposed in the Draft CCP/EA. They indicate we would need to obtain the "necessary permits to construct and operate all stationary sources in the region as well as monitoring emissions from these sources for compliance" and "If the project includes the burning of vegetative debris and construction or demolition material, this activity must meet the requirements under 9VAC5-130 et seq. of the regulations for open burning, and it may require a permit." They also suggest methods to minimize the fugitive dust caused during construction activities and requirements for open burning, as outlined in 9VAC5-50-60 et seq. of the Regulations for the Control and Abatement of Air Pollution.

Response: We will adhere to all requirements for permits and consultations that apply to national wildlife refuges. In addition we will include the following recommendations for minimizing fugitive dust during construction as strategies in the CCP in Chapter 4 under "General Refuge Management, Refuge Staffing and Administration—Facilities Construction and Maintenance."

- Use, where possible, of water or chemicals for dust control
- Installation and use of hoods, fans, and fabric filters to enclose and vent the handling of dusty materials
- Covering of open equipment for conveying materials
- Prompt removal of spilled or tracked dirt or other materials from paved streets and removal of dried sediments resulting from soil erosion

Coastal Zone Management

(Letter ID#: 47)

Comment: The VA Coastal Zone Management Program (VA CZMP) emphasized that in addition to its responsibilities under the Coastal Zone Management Act to insure consistency, it could play a partnership role in CCP planning, including land protection, blue and green infrastructure planning, and public access. They describe several initiatives they are involved to promote these programs. They suggest the Service include a brief description of these initiatives in the final CCP to “help to enhance coordination...” and also that the Service includes representatives from each of the planning district commissions in future refuge planning efforts.

Response: We now identify the VA CZMP as a prospective partner in the CCP, Chapter 4, under “General Refuge Management, Protecting Land. In addition, we include a partnership with this agency as a strategy in Chapter 4 under Goal 5, Objective 5.4—Intergovernmental Partnerships.

Prescribed Burning

(Letter ID#: 39)

Comment: One commenter recommends that all prescribed burning be banned in the area, stating the “...release of fine particulate matter” contributes to medical issues such as “...lung cancer, heart attacks, strokes, pneumonia, and asthma.”

Response: We burn approximately 240 acres/year following strict protocols designed to minimize impacts to human health and safety. We only burn when wind conditions are such that smoke and particulate matter are well diluted in the atmosphere and carried away from sensitive areas such as hospitals, or concentrations of residential development. We obtain all permits and follow all regulations and notification requirements for national wildlife refuges.

Water Resources

(Letter ID#: 47)

Comment: The VA DEQ letter requests that all efforts should be taken to avoid impact to adjacent streams, rivers or wetlands (including water supply). They concur “...that this project will not adversely affect surface water, wetland or groundwater resources.” Furthermore they request that Corey Chamberlain with the DEQ Piedmont Regional Office is contacted prior to land disturbing activities to ensure consistency with the Virginia Water Protection Program if surface waters or wetlands are proposed to be impacted. Comments specific to water supply include, “...[Virginia Department of Health] states that potential impacts to public water distribution systems or sanitary sewage collection systems must be verified by the local utility.” They also make specific recommendation to mitigate water resource impacts.

Response: We will adhere to all requirements for permits and consultations that apply to national wildlife refuges. In addition, we will include the following recommendations for protecting water resources as strategies in CCP Chapter 4, under “General Management, Refuge Staffing and Administration—Facilities Construction and Maintenance”:

- Grounds should be landscaped with hardy native plant species to conserve water as well as minimize the need to use fertilizers and pesticides.
- Convert turf to low water-use landscaping such as drought resistant grass, plants, shrubs and trees.
- Low-flow toilets should be installed in new facilities.
- Consider installing low-flow restrictors/aerators to faucets.
- Improve irrigation practices by upgrading with a sprinkler clock; watering at night, if possible, to reduce evapotranspiration (lawns need only 1 inch of water per week and do not need to be watered daily; over watering causes 85 percent of turf problems);
- Improve irrigation practices by installing a rain shutoff device
- Improve irrigation practices by collecting rainwater with a rain bucket or cistern system with drip lines.
- Consider replacement of old equipment with new high-efficiency machines to reduce water usage by 30-50 percent per use.
- Check for and repair leaks (toilets and faucets) during routine maintenance activities.
- Design stormwater controls to replicate and maintain the hydrographic condition of the site prior to the change in landscape. This should include, but not be limited to: Utilizing bioretention areas; and minimizing the use of curb and gutter in favor of grassed swales. Bioretention areas (also called rain gardens) and grass swales are components of low impact development. They are designed to capture stormwater runoff as close to the source as possible and allow it to slowly infiltrate into the surrounding soil. They benefit natural resources by filtering pollutants and decreasing downstream runoff volumes.
- When designing and constructing new trails, use permeable trail surfaces that allow the infiltration of groundwater into the soil.

Wetlands

(Letter ID#: 47)

Comment: The VA DEQ letter requests that undisturbed forest, stream, and wetland impacts should be avoided to the maximum extent practicable. They make specific recommendations to minimize unavoidable impacts to wetlands and waterways when planning for land-disturbing activities.

Response: We will adhere to all requirements for permits and consultations that apply to national wildlife refuges. In addition, we will include the following recommendations for protecting wetlands as strategies in CCP Chapter 4 under Goal 3, Objective 3.1—General Wetlands Protection:

- Operate machinery and construction vehicles outside of stream-beds and wetlands; use synthetic mats when in-stream work is unavoidable.
- Preserve the top 12 inches of material removed from wetlands for use as wetland seed and root-stock in the excavated area.
- Place heavy equipment, located in temporarily impacted wetland areas, on mats, geotextile fabric, or use other suitable measures to minimize soil disturbance, to the maximum extent practicable.
- Restore all temporarily disturbed wetland areas to pre-construction conditions and plant or seed with appropriate wetlands vegetation in accordance with the cover type (emergent, scrub-shrub or forested). The applicant should take all appropriate measures to promote re-vegetation of these areas. Stabilization and restoration efforts should occur immediately after the temporary disturbance of each wetland area instead of waiting until the entire project has been completed.
- Place all materials which are temporarily stockpiled in wetlands, designated for use for the immediate stabilization of wetlands, on mats or geotextile fabric in order to prevent entry in state waters. These materials should be managed in a manner that prevents leachates from entering state waters and must be entirely removed within thirty days following completion of that construction activity. The disturbed areas should be returned to their original contours, stabilized within thirty days following removal of the stockpile, and restored to the original vegetated state.
- All non-impacted surface waters within the project or right-of-way limits that are within 50 feet of any clearing, grading or filling activities should be clearly flagged or marked for the life of the construction activity within that area. The project proponent should notify all contractors that these marked areas are surface waters where no activities are to occur.
- Measures should be employed to prevent spills of fuels or lubricants into state waters.
- Maintain undisturbed wooded buffers of at least 100 feet in width around all onsite wetlands and on both sides of all perennial and intermittent streams.

Soils and Erosion

(Letter ID#: 47)

Comment: The VA DEQ raises concerns regarding the construction of new facilities and land disturbance. They request that we “...prepare and implement an erosion and sediment control plan to ensure compliance with state law and regulations.” Also, they state “...the FWS is ultimately responsible for achieving project compliance through oversight of on-site contractors, regular field inspection, prompt action against non-compliant sites and other mechanisms consistent with agency policy.” They also outlined specific recommendations for protecting soils from erosion.

Response: We will adhere to all requirements for permits and consultations that apply to national wildlife refuges. In addition, we will include the following recommendations for protecting soils in CCP Chapter 4, under “General Management, Refuge Staffing and Administration—Facilities Construction and Management”:

- Strictly adhere to erosion and sediment control, and stormwater management practices
- Establish (prior to implementation of the project) and maintain erosion and sediment control and best management practices (BMPs) during all construction/burning activities until bare soils are stabilized and vegetated to reduce the amount of surface water runoff entering the adjacent surface waters, including wetlands.
- Follow the specifications stated in the Virginia Department of Conservation and Recreation (DCR) Erosion and Sediment Control Handbook (1992, 3rd edition).

Historic/Cultural Resources

(Letter ID#: 47)

Comment: The VA DHR comments on the need for the Service to consult with its department according to Section 106 of the National Historic Preservation Act. The commenter cites that “the preservation act requires federal agencies to consider the effects of federal projects on properties that are listed or eligible for listing on the National Register of Historic Places. Section 106 also applies if there are any federal involvements, such as licenses, permits, approvals or funding.”

Response: We received a letter on August 20, 2009 from Roger Kirchen, VA Department of Historic Resources after his review of the Draft CCP/EA. That letter is included as Appendix E. We will continue our consultation with his office as we plan specific activities.

Local Economy/Socio-Economics

(Letter ID#: 39)

Comment: One commenter asserts that wildlife viewing activities greatly outspend hunting activities. The individual feels this greater benefit from wildlife viewing should come into consideration when developing refuge plans and programs.

Response: The six priority public uses for the Refuge System include both non-consumptive activities (i.e. wildlife observation and photography, and environmental education and interpretation) and consumptive activities (i.e. hunting and fishing). There is no priority order to these six uses. It is established in Service policy (603 FW 2) that the Refuge Manager must evaluate the compatibility of these priority activities in developing refuge programs. The process to make compatibility determinations is defined in this same policy. It considers the impacts of the activities on refuge resources and the impacts among and between other uses on the refuge. The consideration of how much a particular use contributes to the local economy is not part of the evaluation.

Farming

(Letter ID#: 1, 35)

Comment: Two commenters indicate concern with a significant loss of local farmland in the area. One commenter suggests that local farming helps contribute to the local and national economy while also providing food for wildlife. The other respondent believes that a better plan than phasing out cooperative farming is to continue it on existing farmlands on the refuge and on any future farmland additions to the refuge. This commenter also feels it was important to maximize “...education and assistance to farmers to enhance their role in conservation.”

Response: We have also observed the decline in farmlands in the local area. This is particularly troubling to us when the land is sold for development or otherwise results in habitat loss. We expressed our concern in more detail in the Draft CCP/EA Chapter 1, under “Issues, Concerns, and Opportunities—Land Protection.” In the Draft CCP/EA, Chapter 3, “Actions Common to All Alternatives—Land Protection” we describe our land acquisition program priorities, including our easement program which is designed to protect or enhance natural resources while promoting the continuation of traditional uses of the land, including farming. In this same section, under “Cooperative Farming”, we explain how this program has been an integral component of refuge habitat restoration and management over the years, and will continue to benefit us on an interim basis, while we evaluate its role in our future management direction. We also mention in this section how we will explore over the next 2 years the possibility of keeping a small area in agriculture to demonstrate and interpret best management farming practices that protect water quality and benefit wildlife habitat.

Also, in the Draft CCP/EA, Chapter 3, Alternative B, Goal 3, Objective 1.4—Grasslands/New Areas we explain a process for evaluating how we will evaluate cropland farming on existing and future refuge lands. We mention here that we would consider the potential to use fields on the Tayloe tract to conduct the demonstration and interpretation of best management farming practices.

Service policy (601 FW 3 Biological Integrity, Diversity and Environmental Health) states that “We do not allow refuge uses or management practices that result in the maintenance of non-native plant communities unless we determine that there is no feasible alternative for accomplishing refuge purpose(s). For example, where we do not require farming to accomplish refuge purpose(s), we cease farming and strive to restore natural habitats.” The Refuge Manager has determined that farming is not required to achieve refuge purposes, and lands formerly in agriculture can be restored to create more benefits for wildlife than when farmed. We are taking a phased, measured approach to eliminating farming so we can appropriately restore these lands to natural habitats. If we decide that limited farming should be retained for demonstration purposes, a new compatibility determination will be required.

All of the discussions and actions mentioned above that were part of the Draft CCP/EA, are also carried forth in the CCP.

Fish and Wildlife Resources

(Letter ID#: 37, 47)

Comment: The VA DGIF determines there are “likely impacts upon fish and wildlife resources and habitat, and recommends appropriate measures to avoid, reduce or compensate for those impacts” based on the proposed actions. They add recommendations to the proposed wildlife and fisheries management strategies to protect listed species and valuable resources and provide and manage hunting and fishing programs.

Response: We will include the following recommendations for protecting fish and wildlife in Chapter 4 under the respective goals and objectives noted:

- Continue to work closely with VA DGIF to develop specific wildlife and fisheries management strategies, protect listed species and valuable resources, and provide and manage hunting and fishing programs (Goal 5, Objective 5.4—Intergovernmental Partnerships).
- Continue working with VA DGIF and the National Marine Fisheries Service (NMFS) to appropriately manage the Rappahannock River and its tributaries that are designated Anadromous Fish Use Areas and protect them from degradation and coordinate with VA DGIF any time work in these waters and/or their tributaries is necessary (Goal 5, Objective 5.4—Intergovernmental Partnerships).
- Submit any proposals for a fish ladder on Wilna Pond to VA DGIF for review. More data may need to be captured to determine if target species reach the dam and whether, therefore, a fish ladder provides any benefit to the aquatic life in the streams and associated ponds (Goal 3, Objective 3.1—General Wetlands Protection).

Comment: One commenter has extensive comments opposed to trapping.

Response: We do not allow trapping as a public activity on the refuge. In the Draft CCP/EA, Chapter 3, “Actions Common to All—Controlling Pest Plant and Animals” we describe our strategies for dealing with those plants and animals that pose a safety or health concern, or are impacting refuge facilities. We describe the integrated approach we use to make decisions on what is the most effective and efficient control measures, which range from non-lethal techniques to lethal controls such as trapping. We also state in this section that public trapping is not allowed on the refuge. Trapping will be considered on a case-by case basis, and will be conducted by refuge staff or a cooperator, to help alleviate a specific problem. Trapping in this case is considered a management activity and not subject to compatibility standards.

Bald Eagles

(Letter ID#: 21, 47)

Comment: The VA DGIF requests that we coordinate with them to protect the state-listed bald eagle and the habitat upon which it depends. Another respondent was specifically concerned about the impacts on bald eagles if waterfowl hunting was allowed on the refuge. The commenter states, “...concern about allowing waterfowl hunting in the refuge portion

near Catpoint Creek. As you may know, there is a significant Bald Eagle population in the vicinity of this location and I would be very concerned about the impact of increased gunfire on the eagles.”

Response: Bald eagle protection is a major priority for the refuge and is one of the reasons the refuge was established. We emphasized the importance of the refuge to the regional bald eagle population in the Draft CCP/EA, Chapter 2, under Refuge Biological Resources. In Draft CCP/EA, Chapter 3, Goal 2, Objective 2.2—Bald Eagle Roost and Nest Sites, we specifically develop management actions to further their conservation in the area. Part of our evaluation of whether to allow waterfowl hunting would include impacts on bald eagles and other wildlife and habitats that would be sensitive to that activity. We plan to engage VA DGIF in developing those plans. However, to emphasize our cooperative relationship, we will include a strategy under Goal 2, Objective 2.2 in the CCP that we will coordinate with them in developing plans that might impact bald eagles.

Threatened and Endangered Species

(Letter ID#: 47)

Comment: The VA DCR comments on an error related to the status of a fish, spotted margin madtom, in Appendix A of the Draft CCP/EA. They also directed us to contact VA DNH for an update on natural heritage information if a significant amount of time passes before aspects of the plan are implemented since new and updated information is continually added their database.

Response: We incorporated their suggested edits into the document and will obtain regular updates from VA DCR on natural heritage information. In addition, our Ecological Services Virginia Field office reviewed Alternative B and concurred that implementing it is not likely to have an adverse effect on any current, Federal-listed species. The results of that review and consultation are included as Appendix F.

Public Use and Access

(Letter ID#: 1, 37, 47)

Comment: The VA DCR make specific recommendations about improving or increasing access to refuge lands and waters.

In addition, individuals note the need for increased public access and/or supported our proposed efforts to increase recreational opportunities. One commenter notes the need for more access that “...would not hinder the wilderness character of the Refuge.”

Additional public access opportunities requested include:

- Allowing horseback trail access
- Adding additional hiking trails
- Opening additional refuge tracts to public access
- Increasing wildlife observation opportunities

- Increasing public access to the river
- Additional non-motorized watercraft access
- Additional wildlife-dependent use access (i.e. fishing access)
- Other boating, swimming, and beach access.

Response: In planning which public recreational uses to consider, we first evaluated the potential to expand or enhance the six priority public uses. We next considered other uses that would not materially detract from the purposes for which the refuge was established. We describe some of the uses that were determined not to be appropriate in Draft CCP/EA, Chapter 2, “Other Public Uses.” Appendix B compiles all the uses that were evaluated in detail to determine appropriateness and compatibility. We believe the combination of activities we propose in Alternative B, under Goal 4, and carried forth in the CCP, provide the best mix of activities, with emphasis on the priority public uses, that should be developed over the next 15 years.

We will incorporate the following recommendations made by VA DCR into Chapter 4, Goal 4, as strategies under Objective 4.4—Recreational Fishing, or Objective 4.5—Wildlife Observation and Photography, as indicated:

- Increase public access to the river with the addition of low impact launch sites in areas that are compatible with FWS objectives for the RRVNWR—particularly for paddle craft that would not result in noise or wake disturbance, and would not hinder the wilderness character of the Refuge (Goal 4, Objective 4.4—Recreational Fishing).
- Consider providing additional non-motorized water craft access at the following locations: Laurel Grove Unit (Laurel Grove Pond) and Island Farm Unit (Goal 4, Objective 4.4—Recreational Fishing). (*Note: Public access points currently exist at or near Refuge lands at Hutchinson, Wilna, Wright, and Toby’s Point Units. Other waterfront tracts recommended by VA DCR for potential public water access are unsuitable due to topography, presence of wetlands, or concern for wildlife impacts).
- Consider public access to the river where it is compatible with Refuge objectives and will complement existing gaps in public access (Goal 4, Objective 4.4—Recreational Fishing).
- Ensure that all future acquisitions, development and ecological enhancements should contribute to the scenic integrity of the Rappahannock River, a potential scenic river (Goal 4, Objective 4.5—Wildlife Observation and Photography).

Comment: The VA DGIF requests that we consider largemouth bass harvest fishing on Wilna and Laurel Grove tract ponds, and re-consider a lead sinker ban for fishing in refuge ponds.

Response: We respectfully disagree with VA DGIF regarding allowing largemouth bass harvest from refuge ponds. Our current catch-and-release program is based on the advice of our Fisheries Program experts who, after assessing fish populations in Wilna Pond, are concerned that it could be over-fished, and the current trophy-sized fish known in the pond could disappear. We have not completed our assessment in Laurel Grove Pond. However, we will reconsider this restriction within one or both ponds if future fish population assessments provide a more favorable result. In fact, we intend to conduct another fish assessment in Wilna Pond, and will continue to assess Laurel Grove Pond, within two years, and will reevaluate our harvest regulations accordingly.

With regard to lead sinkers, we again must respectfully disagree in part. Our ultimate goal is to rid the refuge of lead sinkers. It is well documented how toxic they are to fish and wildlife and we want to reduce, if not eliminate, that risk. We plan to continue our ban on lead sinkers in refuge ponds because of the wide range of fishing tackle available that is lead-free. This is not true of fishing gear for use in tidal waters. As such, we will not require lead-free gear in tidal waters until such gear is reasonably available. We have changed this requirement for tidal waters in the compatibility determination for Recreational Fishing in CCP Appendix B.

Hunting (Non-waterfowl)

(Letter ID#: 1, 4, 5, 6, 7, 8, 10, 12, 13, 14, 17, 18, 22, 25, 26, 28, 29, 32, 33, 34, 35, 37, 39, 40, 47)

Comment: Twenty-five respondents comment on the proposed hunting activities on the refuge. Of those, most commenters are in general support of hunting. Some suggest expanding hunting to include turkey, waterfowl, rabbit, ground hog, and upland small game hunting. The VA DGIF specifically requests developing more youth hunting programs. Some commenters felt increased hunting activity would help regulate animal populations and enhance family-oriented and outdoor activities on public lands. One commenter notes the need for more opportunities to deer hunt using hounds.

Other comments indicate opposition to any hunting activities on the refuge. Most note that hunting should not a priority of the refuge. One commenter maintains that “efforts to manage and regulate hunting and trapping can quickly detract from efforts aimed at more important refuge purposes including migratory bird and endangered species protection.”

Response: In the Draft CCP/EA, Chapter 3, Goal 4, in the rationale for Objective 4.1—Deer Hunting, we describe that our highest priorities over the next 15 years are to develop a quality hunting opportunity for deer, and to evaluate hunting opportunities for waterfowl (see also Objective 4.2) and wild turkey (see also Objective 4.3). We further explain that over the next 15 years, assuming resources and support are available and we have made progress on evaluating the waterfowl and turkey hunts, a secondary priority will be to evaluate opportunities for small game hunting. This same rationale is brought forward into the CCP, Chapter 4, Objective 4.1—Deer Hunting.

As we move forward with assessing new hunting programs, and enhancing our public deer hunt, we will consider special youth hunting events in collaboration with State and non-profit partners.

Specific comments on waterfowl hunting are discussed below.

Waterfowl Hunting

(Letter ID#: 2, 3, 9, 20, 30, 46)

Comment: Several commenters feel that waterfowl hunting should be considered in the final CCP. Reasons given include the need for additional waterfowl hunting opportunities on public lands, and the importance of hunter expenditures within the local economy. One commenter also points out that hunting helps promote youth's "understanding and appreciation of natural resources and their management on lands and waters." Another respondent notes that the Refuge is partially funded by the Federal Duck Stamp which is purchased by waterfowl hunters.

Others are opposed to waterfowl hunting. Reasons include their belief that waterfowl hunting is counter to the purpose of the refuge concept and that the refuge "...sanctuary for all wildlife and opening it to hunting would hurt the overall objectives of the refuge model." One person notes that the refuge serves as a vital resting place for migratory birds and efforts to "open it up" for hunting are not in the best interest of the flyway. They further comment, "...There are ample opportunities along the Rappahannock for hunters, and the Refuge needs to remain as it is."

Response: In the Draft CCP/EA, Alternative B, Goal 4, Objective 4.2—Waterfowl Hunting, we propose to evaluate establishing a waterfowl hunt. This objective was brought forth in the CCP as well. We believe that evaluation is worth pursuing because it supports a priority public use, it is an established and traditional use in the local area, and would allow us to work with VA DGIF to control the distribution and intensity of hunting along the refuge boundary. However, we are also concerned about the potential to disturb waterfowl and would make this a major consideration in our evaluation. We hope to complete the evaluation within five years of CCP approval.

Comment: One commenter specifically mentions that stationary blinds not be allowed within the refuge. They express concern that if hunters are allowed stationary blinds, then "...those hunters would claim the spot as their own and other hunters would be unable to use the spot even if the hunters were not there." The commenter suggests the use of floating blinds instead as long as there are no "blind stake" requirements.

Response: As we note above, we have not yet initiated our evaluation to determine whether we could implement a compatible waterfowl hunting program. Therefore, no details have been discussed about how a hunt program would be implemented. However, we do understand the concerns expressed.

Transportation (Roads, Trails)

(Letter ID#: 39, 47)

Comment: One commenter is against roads within the refuge and stated that no new roads should be developed on refuge lands. The VA DOT notes that if increased visitation caused the need for further road construction, the Service should comply with all VA DOT regulations,

including obtaining the proper VA DOT permits and utilizing appropriate environmental protections to access areas off the VA DOT right-of-way.

Response: No new road construction is planned on existing refuge lands; only general maintenance is planned.

Safety (Firearms)

(Letter ID#: 16, 23, 37)

Comment: Three respondents comment on the issue of the safety of using and carrying firearms on the refuge. One commenter was concerned with the safety of those users not there to hunt and not carrying firearms. They state that "...hikers, bird watchers, campers, and photographers are entitled to enjoy the small percentage of public lands designated as wildlife refuges free from the dangers of stray bullets or from witnessing the maiming and killing of wildlife." The other commenters suggest that people have the right to carry legal and licensed weapons on the refuge. One of these latter respondents justifies the right by stating that each person that legally carries firearms has taken a firearms safety course and demonstrated their ability to use the firearms safely.

Response: We abide by the current Code of Federal Regulations (50 CFR Part 32) regarding possession of firearms on refuge lands. Currently, only permitted hunters are allowed to carry weapons on refuge lands. Our hunt programs are designed to promote the safety of hunters and other visitors. Hunting is segregated from other uses on the refuge for visitor safety and to prevent visitor conflicts. Effective February 22, 2010, however, new regulations will be implemented. On May 22, 2009, The President signed the Credit Card Accountability, Responsibility, and Disclosure Act. Section 512 of that Act prohibits the Secretary of Interior from promulgating or enforcing "...any regulation that prohibits an individual from possessing a firearm including an assembled or functioning firearm in any unit of the National Park System or the National Wildlife Refuge System if...possession of the firearm is in compliance with the law of the State in which the unit of the...National Wildlife Refuge System is located." Once those new regulations are in place in 50 CFR Part 32, we will abide by them.

Motorized Use

(Letter ID#: 37, 39)

Comment: One commenter identifies concern with the use of motorized watercraft and two-stroke engines, while another expresses concern with the use of ATVs and snowmobiles. Both commenters note that motorized use could have negative impacts within the refuge and that potential impacts should be assessed, or the activities banned completely. The person commenting on watercraft feels the negative impacts of motorized watercraft include adverse effects on aquatic life by inducing stress, increasing the risk of mortality, and interfering with communication, reproduction, and navigation. This respondent also notes a national poll revealing that most visitors oppose jet skis and large powerboats in National Parks. They also state, "...according to the California Air Resources Board, as much as 30 percent of the gasoline used in two-stroke engines is discharged unburned into the environment."

Response: We note that use of ATVs is determined to be an inappropriate use (Appendix B). We did not specifically address use of snowmobiles due to the infrequent accumulation of snow in our vicinity. Currently, snowmobile use would not be permitted without a compatibility determination and special use permit. No access is planned for gas-powered boats; only electric motors are allowed or proposed on refuge waters.

Document Scope

Outside the Scope of the CCP

(Letter ID#: 37, 39, 47)

Comment: Certain comments we receive are out of the scope of the CCP, or are not substantive in nature or related to the proposed actions we describe in our Draft CCP/EA. Some are commentary of a political nature. For example, one comment we received states that "... national taxpayers should be the primary people involved in refuge planning, not "local profiteers" using national lands as an opportunity for personal riches."

Response: As a public agency, our planning documents are open and available to all who wish to comment on them.

Attachment 1—Letter ID Numbers and Respondents

Letter ID Number	Name
1	Delores Flessner
2	Brad Stephenson
3	Matt Teese
4	Ray and Julie Wickham
5	Ray Lough
6	Margaret Gentges
7	Donald Roberts
8	Steve Garbett
9	Tom McGinniss
10	Daniel Butkiewicz
11	Mary Miles
12	Kareem Abushar
13	David Brenningmeyer
14	David Bisbee
15, 41, 46	Jeff Browning—Northern Virginia Chapter of Delta Waterfowl
16	Elen Nox
17	Marshall Hart
18	Charles Dever
19	Mike Feehan
20	William Rees
21	Matthew Steilberg
22	John Batcheller
23	Dr. Byron Jones
24	Edward Wooldridge
25	John Pulliam
26	Randoll Carroll
27	Alex Long
28	Marion Packett
29	Curtis Packett
30	Richard Strauss

Letter ID Number	Name
31	Eric Jenkins
32	Todd Kelsey
33	Eric Lipp
34	Mark Crain—Northern Virginia Chapter of Delta Waterfowl
35	John Elkin Jr.
36	Cheri Ehrhardt
37	Camilla Fox—Animal Protection Institute
38	Jim Hines
39	B. Sachau
40	Anonymous
42	Elena Ellis
43	Judy Allen
44	Julia Wellman—Virginia Department of Environmental Quality
45	Barry Brady
47	Ellie Irons—Virginia Department of Environmental Quality (consolidates comments from 8 state agencies)

Appendix H

USFWS



Cat Point Creek

Finding of No Significant Impact

Finding of No Significant Impact

Rappahannock River Valley National Wildlife Refuge Comprehensive Conservation Plan

In July 2009, the U.S. Fish and Wildlife Service (Service) published the Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Rappahannock River Valley National Wildlife Refuge (refuge). The approved refuge boundary extends approximately 65 miles along both sides of the Rappahannock River in Caroline, Essex, King George, Lancaster, Middlesex, Richmond, and Westmoreland counties, Virginia. This refuge is part of the Eastern Virginia Rivers National Wildlife Refuge Complex (Refuge Complex) which also includes James River, Presquile, and Plum Tree Island refuges. The Rappahannock River Valley Refuge Draft CCP/EA evaluates three alternatives for managing the refuge over the next 15 years. It carefully considers their direct, indirect, and cumulative impacts on the environment and their potential contribution to the mission of the National Wildlife Refuge System (Refuge System). The Draft CCP/EA restates the refuge's purposes, creates a vision for the next 15 years, and proposes five goals to be achieved through plan implementation. Alternative B is identified as the Service-preferred alternative. Chapter 3 in the draft plan details the respective goals, objectives, and strategies for each of the three alternatives. Chapter 4 describes the consequences of implementing those actions under each alternative. The draft plan's appendixes provide additional information supporting the assessment and specific proposals in Alternative B. A brief overview of each alternative follows.

Alternative A (Current Management): The Council of Environmental Quality regulations on implementing the National Environmental Policy Act (NEPA) require this "No Action" alternative, which we define as current management. Alternative A includes our existing programs and activities and serves as the baseline against which to compare the other alternatives. Under Alternative A, we would continue to use a variety of habitat management tools to maintain and improve the refuge's grasslands and forests, and would continue to work with willing sellers to protect additional lands (up to 22,000 acres total) within the approved refuge boundary. Cooperative farming would be phased out. We would continue our efforts to control invasive species across all refuge habitats as funding permits. We would maintain our current level of effort in conducting baseline inventories and in monitoring the results of management actions to improve the status of targeted species. Our visitor facilities and programs would continue at present levels, whereby we offer opportunities for all six priority recreational uses of the Refuge System at modest levels. We would continue to offer hunt programs for deer, recreational fishing at the Wilna Tract, on-and off-site interpretation and environmental education visits up to 40 times per year, wildlife observation on several tracts, most by reservation only, and limited photography opportunities. Staffing would remain at seven positions for the entire Refuge Complex. Administrative facilities, including our 19th century headquarters

building, would be maintained for extended future use as funding permits. While this alternative is intended as a “snapshot in time,” we include activities that were underway at the time the plan was being prepared, some of which are completed, and some of which are still in progress.

Alternative B (the Service-preferred alternative): This alternative includes an array of management actions that, in our professional judgment, work best toward achieving the purposes of the refuge, our vision and goals for those lands, the Refuge System mission, and the goals in State and regional conservation plans. Under Alternative B, we would expand areas managed as grasslands from about 700 acres to a maximum of 1,200 acres. We would increase forest management by thinning overstocked stands, and planting new areas with trees to supplement natural regeneration, especially in riparian zones. We propose to widen forested riparian buffers to a width of at least 330 feet, and to 1,000 feet where feasible. We would continue invasive species control and expand our efforts, including assistance to private landowners, if staffing and funding are increased. We will ensure that our monitoring and inventory procedures contribute to both refuge and regional needs. We propose to expand visitor opportunities for all six priority uses of the Refuge System. Among newly proposed programs, some of which will require additional environmental analysis, are waterfowl and turkey hunting, expanded recreational fishing, new photo blinds, expanded environmental education programs on and off-site, and an increase in interpretive signs and wayside exhibits. Interpretive messages will include reference to the Captain John Smith Chesapeake National Historic Trail, the historic role that farming has played in wildlife management, bald eagle ecology and management, and migratory bird conservation. Pending future funding, we would move our headquarters from the 19th century Wilna House to a newly constructed facility on the Hutchinson Tract. A new building would offer better access for the public and allow us to keep the Wilna House in a more historic condition. We would create small visitor contact hubs at Port Royal, Laurel Grove, and the Warsaw area in addition to the Hutchinson Tract near Tappahannock. We would seek funding for four additional staff positions to help implement new and on-going management activities.

Alternative C: Alternative C is similar in many respects to Alternative B, but would place greater emphasis on forest management over grassland management. We would allow the 700 acres of managed grassland to revert to shrub and forest habitats. Croplands, once taken out of cultivation, would be planted in trees, or allowed to naturally revert to forest. Staff time not needed for intensive grassland management would be directed toward additional work in improving forest habitat, including thinning overstocked stands, established new forested areas, improving forest health assessments, and controlling forest pests. Biological monitoring and inventories would be shifted from assessing grassland management to techniques more oriented toward forest conversion and management. Visitor services improvements, including new recreational programs, would be consistent with those outlined in Alternative B. The same is true for goals and objectives relating to staffing and administration.

We distributed the Draft CCP/EA for a 35-day period of public review and comment from July 23 to August 28, 2009. We received 47 unique letters representing individuals, organizations, and state agencies. Appendix G in the final CCP includes a summary of those comments and our responses to them.

After reviewing the proposed management actions, and considering all public comments and our responses to them, I have determined that the analysis in the EA is sufficient to support my findings. I am selecting Alternative B, as presented in the Draft CCP/EA with the minor changes listed below, to implement as the final CCP. Changes we made in the final CCP are:

- We included a map of the proposed public use facilities on the Wellford Tract that we inadvertently omitted in the Draft CCP/EA.
- We inserted language recognizing the important partnership we have with state agencies and the need to follow required state regulations during construction of new facilities.
- We clarified our position on cooperative farming.
- We clarified our position regarding use of gas-powered boats and water access.
- We corrected all format and typographical errors that were brought to our attention.

I concur that Alternative B, with the above changes and in comparison to the other two alternatives, will: best fulfill the mission of the Refuge System; best achieve the refuge's purposes, vision, and goals; best maintain and, where appropriate, restore the refuge's ecological integrity; best address the major issues identified during the planning process; and is most consistent with the principles of sound fish and wildlife management. Specifically, in comparison to the other two alternatives, Alternative B provides the biggest increase in the diversity, integrity and health of high quality habitats, through enhanced grassland, riparian, shrub and forest management. It also provides the most reasonable and effective improvements to existing public use programs that are in high demand, with minimal impacts to wildlife and habitats. The plans to increase staffing and develop new infrastructure are reasonable, practicable and will result in the most efficient management of the refuge and best serve the American public. This Finding of No Significant impact includes the EA by reference.

I have reviewed the predicted beneficial and adverse impacts associated with Alternative B that are presented in Chapter 4 of the Draft CCP/EA, and compared them to the other alternatives. I specifically reviewed the context and intensity of those predicted impacts over the short and long-term, and considered cumulative effects. My evaluation concludes that implementing Alternative B would not result in any concerns with public health or

safety, nor result in adverse implications to any unique cultural or natural characteristics of the geographic area, including wetlands or Federal-listed species. I find that implementing Alternative B adheres to all legal mandates and Service policies, and will not have a significant impact on the quality of the human environment, in accordance with Section 102(2)(c) of NEPA. Therefore, I have concluded that an Environmental Impact Statement is not required, and this Finding of No Significant Impact is appropriate and warranted.

Dawn Comish

Acting Marvin E. Moriarty
Regional Director
U.S. Fish and Wildlife Service
Hadley, Massachusetts

12/30/09

Date

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